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THE MARINE REVIEW

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the Business of Transportation by Water.

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What Have We Done in Two Years?

The Opening of the European War Revealed the Need for an American Marine—What Has Been Done to Give Us These Ships?

THE American merchant marine for years has suffered from the scarcity—almost the absence—of knowledge on the part of the public of the meaning of that simple three-word phrase. Practically everyone, of course, knew a merchant marine was associated with ships. But of even the elementals of shipping customs, of constructive shipping policies or of the causes of our decline as a maritime factor, they had little or no knowledge.

The country suffers in this respect from its vastness. Millions of the one hundred million in this country have never seen the Atlantic, the Pacific, the Gulf of Mexico, or even the Great Lakes. Their knowledge of water-borne craft is confined to row boats, power boats, or at best a small river steamer. They realize vaguely that somewhere beyond the horizon big boats as long as the city block between the public square and East Market street, are crossing a big mass of water which they remember is colored blue on the maps. They live and have their being apart from any need of this ocean commerce—so they think.

Bloodshed Levels Horizons

The European war has leveled many obstructions that confined people's views to their immediate horizon. Nations have learned that they are interdependent, and not independent of other nations. New Caledonia may need American steel, but we need her nickel.

The inhabitants of this country's hinterland required "The War of Fourteen Nations" to disturb their complacent belief in their independence. When the railroads began to talk of embargoing their farm produce because of the lack of ships at the opening of the war, it was driven home through the most vulnerable spot—their pocketbooks, that ships were necessary and that this country should have all the ships she needed to handle her trade.

Two years have elapsed since and the results of this broadened interest are imperceptible. The administration, endeavoring to seize the opportunity, offered as the only panacea a chimerical scheme of government

ships. The discussion settled around this phase of the situation, and interest was again diverted from the main issue. More ships began to appear at our ports, dispatch improved, ship building began in earnest, and the old mantle of apathy settled over the country.

Two Years Too Late

And now two years later the government-ownership plan is given congressional approval. The reasons for its existence, if there were any, are gone. American capital is building ships, our foreign trade is being carried more and more in American bottoms, and during the continuance of present feverish conditions these hopeful conditions will continue. A resumption of normal trade, a fall in freight rates, and the restrictive effect of our destructive shipping policy will assert itself.

The only bright spot in our maritime policy has been the restriction of our coastwise trade to American-built ships. While our foreign going ships decreased steadily year by year, our coastwise trade forged ahead. Our high rank as a maritime nation rested on our domestic tonnage. The administration's shipping bill throws open this trade to foreign-built ships admitted to registry under that act. As the *Boston Transcript* remarks, government funds may supply the cash to purchase ships built with pauper labor abroad, and use them or enable their use to take the bread from the mouths of American mechanics who build, or the Yankee sailormen who use, the product of our ship yards.

And Yet We Are Still Asleep

The war news from abroad divides prominence with European plans for capturing trade after hostilities close. Are we content to offer the seamen's law and government-owned ships as our defense in this economic battle? Are free ships for the coastwise trade our answer to the close co-operative efforts European governments and private steamship companies are now making to build up their merchant fleets?

How to Cut Freight Handling Cost

The Development of Electric Vehicles for Service in Terminals and Warehouses

—Relative Expense of Transporting Freight With Automatic and Hand Trucks

By A. Jackson Marshall

THE development of the modern industrial truck can be traced back to the Egyptians and Assyrians. In those ancient times, the trucks were very primitive, but efficient enough to carry some of the great blocks of stone for building the Pyramids. They were nothing more than sledges which were dragged along roads smoothed and hardened to lessen friction. A forked tree limb with boards placed across it for a platform served as a drag. The first improvement was the use of small rollers on the sledge runners, which in time developed into the wheel and axle. This device was first used by the Assyrians and soon developed the wheelbarrow and cart.

In America the modern electric industrial truck is the outgrowth of the necessity for an automatic device efficient enough to cope with the constantly increasing problem of rapid transportation of baggage and freight. As larger terminals and longer baggage rooms, postoffices and express depots were built, a quicker and more capacious truck was demanded. To fill this need an electric hand truck was designed and so successful was the application of the first "electric stevedore" that it was shortly applied to other operations. Since 1911 the development of the electric industrial truck has been rapid. Today over 1,000 of these modern carriers are used in the United States and Canada. The average layman has but a small conception of the tremendous amount of work being done on piers, in railroad terminals and industrial plants by storage battery trucks. It is estimated that in the United States alone, a grand total of 720,000,000 tons of goods passes

The author, A. Jackson Marshall, is secretary, Electric Vehicle Association of America.



FIG. 1—ELECTRIC BAGGAGE TRUCK

through the railroad freight and transfer stations annually. Lack of system in handling this freight and the tremendous amount of lost time involved is estimated to represent a yearly loss of more than \$80,000,000. With existing methods, there is constant confusion and delay, while thousands of conveyances endeavor to get served within a few hours. The transfer mediums are frequently delayed for several hours, with resulting losses.

The use of the "electric stevedore" promotes systematic delivery. With its wide use, the freight sheds and docks in many cases will operate on a 24-hour schedule. Large trucks can transport the goods by night to well located centers from which goods may be dis-

tributed the following day. This offers a solution to the problem of congested freight piers in cities where any increase in the size of the terminals is rendered impracticable for physical reasons. To decrease congestion, increased efficiency is required which will enable vehicles to quickly discharge or receive their loads. This must be effected by speeding up the movement of freight over the platforms, in using more efficient transfer means between the vessel holds or freight cars and the vehicle tail-boards, and in organizing a system of distributing centers to supplement the cramped terminals.

In railway terminals where modern electric carriers have supplanted the hand trucks, it is estimated that the saving is 66 per cent. The electrically propelled baggage truck has proved a fixed necessity. These trucks, piled high with trunks, bags and boxes, as shown in Fig. 1, deftly wind their way along congested station platforms from train to baggage rooms doing the work that formerly required four times as much labor and twice as many trucks.

A short description of the operation of an electric industrial truck shows its simplicity and safety. The controller is inclosed and an automatic cut-off switch minimizes accidents.

One handle is used as a controller lever and the other handle for steering. The controller returns to neutral as the hand is removed from the lever. The cut-off switch cuts off the power when the foot is removed from the brake pedal. The driver thus applies the brake by simply releasing the pedal with his foot, and as he releases the pedal, the power is cut off automatically. The driver stands erect on the end of the truck, with hands on the controller and



FIG. 2—DROP FRAME TRUCK WHICH AVERAGE HANDLER LEARNS TO OPERATE IN 48 HOURS



FIG. 3—HANDLING FREIGHT AT C. & B. DOCK, CLEVELAND

steering lever, respectively, and foot on the brake pedal, and is in good position to guide and control his load, as shown in Figs. 2 and 3. The simplicity of operation does away with the need of expensive operators, the average freight handler being taught to successfully operate a truck, even in congested plants or terminals, in about 48 hours. The ordinary baggage truck has a capacity of 2,000 pounds and is used for carrying both baggage and mail.

Time Studies on Piers

Time studies made in manufacturing plants and at the great piers along the coasts, indicate the value of these "electric stevedores." It is probable that the shipping platforms and piers of the future will be designed especially for the more efficient operation of these trucks.

In Savannah, Ga., cotton is moved across the piers by electric trucks, which are equipped with hoists and cranes. The cotton is carried directly into the holds of the steamers which bring it north. Two of these trucks are said to handle more cotton in one day than 20 freight handlers. At the Bush terminals in Brooklyn, this cotton is placed in cars by battery truck cranes, the cars first being spotted by the electric. It is taken out of the cars at the mill, moved to storage, and later to the spinning room by industrial trucks. Later the bobbins, dye tubs, and beams are moved from mill to mill by small electric shop trucks.

In testimony recently submitted to the interstate commerce commission, it was

stated that in handling macaroni at the Cunard Pier, New York City, six electric industrial trucks performed the work in nine hours, that formerly required 24 hand trucks. The cost of labor with the electric vehicles was \$21, while at current longshoremen's rates the labor cost with hand trucks would have been \$87.60. In handling grapes in barrels at the same dock, two industrial trucks did the work of 21 hand trucks. In handling mackerel in barrels, two electric industrial trucks performed the work of 19 hand trucks. In handling casks of wine, seven electric industrial

vehicles with 13 men, did the work of 36 men rolling the casks from one man to the other.

With hand trucks, the cost per ton of handling freight at railroad terminals and steamship piers is about 25 cents, while the cost per ton for performing the same work with electric industrial trucks is said to be only 101-3 cents. The workman also is benefitted by the use of these trucks. Under the old plan, the men who received a wage of \$2.00 per day, under the truck operating system, where men are paid on a tonnage basis, would be paid \$2.40 per day, an increase of 20 per cent.

Suitable for Many Uses

While the largest field for the electric industrial trucks is in handling baggage and freight at terminals and steamship piers, they are being used to a greater extent in factories and industrial plants. In shop and mill transportation, storage warehouses, freight transfer stations, supply and provisioning work for railroads and steamships, brick and lumber yards, stoking power plants, wholesale and retail packing, shipping and receiving, and even in building operations, these trucks find extensive application.

Various types of trucks have been developed. They are made small enough to operate in the aisles of factories, and storage warehouses, to run on elevators and into freight cars, motor trucks and horse wagons. Their capacity is from one to two tons. They possess sufficient power to haul trains and trailers, can climb grades that would tax the power of mules, and would be impracticable for hand trucks. An electric tractor is shown in Fig. 4. Elevating transfer

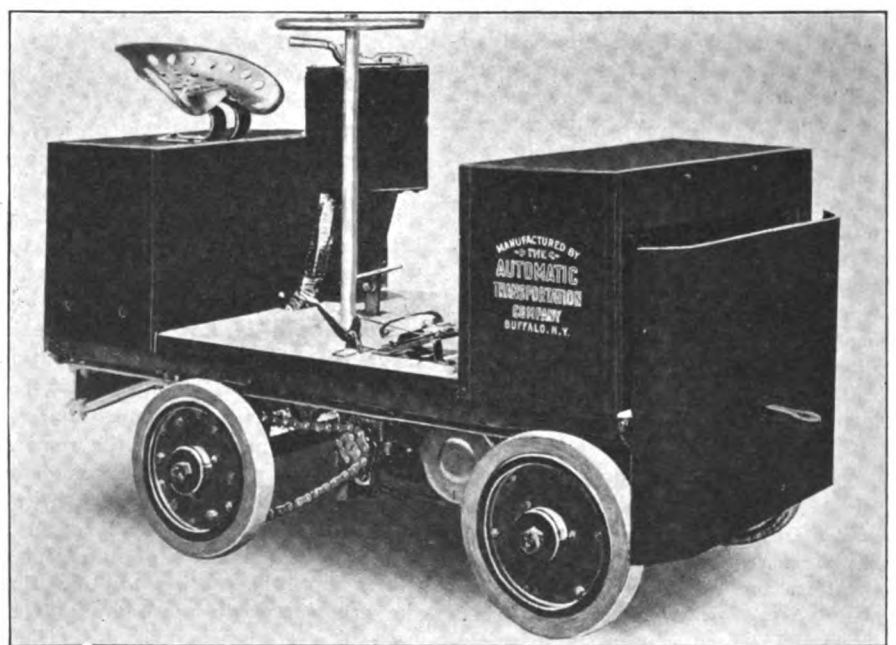


FIG. 4—ELECTRIC TRACTOR

trucks have been developed by which it is possible to pick up, carry away, and set down interchangeable false platforms with piles of goods on them, thus eliminating the last item of hand labor, the loading and unloading of the trucks.

It is too early to determine definitely how much can be saved by the adoption and use of these small trucks. Labor is the most important item. It is claimed that where the trucks can be kept busy and the hauls average 200 to 800 feet, each truck will displace at least four, and often five and six men each. They can make from 20 to 30 miles on a single charge, while boosting during noon hour will increase this mileage one-third. Although the initial cost of the electric industrial truck, is large when compared to the cost of hand-powered equipment, it is claimed that it will save its first cost in 4½ months with careful operation.

Trucks for Canal Piers

In order to expedite the handling of cargo on the piers at Cristobal, Canal Zone, the Panama Railroad Co. has placed an order for electric trucks, in the expectation of increasing the use of such equipment if the results from their operation and the developments of traffic warrant. The order placed was for four electric tractor trucks, each equipped with three trailers, to be furnished by the Buda Co., Chicago; and in addition eight trucks of different type are to be selected by the New York office of the railroad company and sent to the isthmus.

Each of the tractor trucks ordered is 6 feet long over all by 40 inches wide, has a wheel base of 42 inches and wheel gage of 32 inches, four wheels 16 inches in diameter, and a clearance of working parts of 6 inches above the floor. Equipped with two sets of storage batteries, each weighs approximately 2,500 pounds. The steering radius is 5 feet and the speed, with three speeds forward and three in reverse, is from one to seven miles per hour. Each tractor is rated to haul 20,000 pounds on trailers.

It is proposed in the selection of additional trucks to experiment with types equipped with small cranes, making a unit capable of lifting cargo in a sling, transporting it, and delivering it, with a minimum of dependence on human labor.

The China Mail Steamship Co., which has been operating the former Pacific mailer CHINA in the transpacific trade, has purchased another of the old mailers, NILE and will place her on the run also. NILE formerly flew the British flag and has been in war transport service.

Hope to Recover Cargoes

**Most Merchant Vessels Sunk in the War
Lie in Shallow Water and May Be Salvaged**

MOST vessels sunk by accident or in the course of the present war, lie in comparatively shallow waters, many of them at a depth of less than 300 feet, states a writer in the current number of the *Bulletin* of the Pan-American Union. He predicts that the recovery of the millions of dollars worth of cargo at the bottom of the sea is not hopeless in view of recent improvements in deep-sea diving, and the feats accomplished by expert divers of the United States navy. In discussing the organization

series of tests carried on by the British admiralty in 1907.

"Notwithstanding the tremendous pressure, the expert divers of the United States navy have succeeded in not only reaching a depth of 300 to 305 feet, but in remaining at that depth for from 5 to 20 minutes at a time, making examinations and observations in regard to a sunken vessel that made its subsequent salvage possible. This work was done in connection with the raising of the United States submarine F-4, which, it will

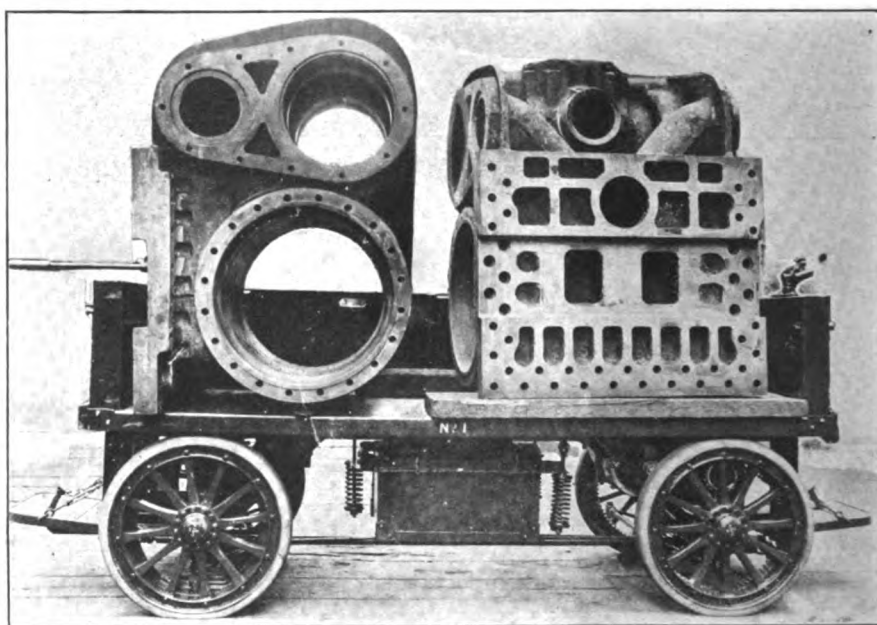


FIG. 5—HANDLING HEAVY LOAD OF CASTINGS

of a company in this country for this purpose, the article says:

"Certain it is that the project of recovering sunken ships, or the most valuable of the treasures that have gone down with them, is more feasible now than it was only four or five years ago. Such great improvements in diving apparatus have recently been made that it is now possible for a diver to operate for a limited time even at the great depth of 300 feet below the surface. These improvements are largely due to the remarkable experiments in deep-sea diving conducted under the auspices of the bureau of construction and repair of the navy department of the United States in 1914. Prior to this time the greatest depth reached by divers was 210 feet, two English officers having accomplished that feat during a

be remembered, plunged to the bottom of the sea just off the harbor of Honolulu on March 25, 1915. Not only did the divers establish a new world's record for deep-sea diving upon that occasion, but the subsequent raising and recovery of the F-4 is the only instance in history where a sunken vessel was recovered from a depth of 300 feet."

More steel barges will be used in the river coal trade of the Pittsburgh district. The American Bridge Co., Pittsburgh, has received a contract from the Carnegie Steel Co. for 70 steel barges to be used by the latter company in transporting coal from its mines on the Monongahela river to its by-product coke ovens now being built at Clairton. Each barge will be 175 feet long and will carry 900 tons of coal on an 8-foot draft of water.

Private Yards to Build U. S. Ships

Navy Will Add 157 Vessels in Three Years and Shipping Board

Expects to Procure 50 Merchantmen—Government Yards Full Now

WITH private and government ship yards congested with work, the problem of expeditiously constructing the vessels provided for in the naval and ship purchase acts is a serious one. Bids for ships involved in the first part of the three-year naval program will be opened by the navy department on Oct. 25. Present plans are to have most of the construction done in private yards. The first year's program calls for four battleships, four battle cruisers, four scout cruisers, 20 torpedo boat destroyers, nine fleet submarines, 30 coast submarines, three fuel ships, one repair ship, one transport, one hospital ship, two destroyer tenders, one fleet submarine tender, two ammunition ships, and two gunboats, 84 in all. In the entire three-year program provision is made for 157 vessels, of which 10 are to be battleships and 10 battle cruisers. This is the greatest naval program ever enacted by any nation.

It was originally the intention of secretary of the navy, Josephus Daniels, to have as many of the ships constructed in the navy yards as possible. He was informed, however, by officials of the various yards that work has been allowed to lag so much, that it would be impossible to take on much added construction, or any contracts the first year for capital ships. In the event he continues in office, no doubt it will be the plan of Mr. Daniels to give as much work as possible to the navy yards for the second and third years. The fact that the naval act appropriates funds for the enlargement of three additional navy yards so that they can construct capital ships would afford him an opportunity of giving this kind of work to the navy yards, despite the delay and much higher cost involved. The act also appropriates money for the enlargement of three other yards for the building of smaller types of vessels.

Daniels Forced to be Patriotic

Having been forced to turn to the private yards for the construction of the greater part of the vessels called for the first year, Secretary Daniels is hopeful that they will respond liberally to his request for bids. It is proposed that among others, the four battleships, four battle cruisers, four scout cruisers, and 20 destroyers be built at private yards. The fuel ship will be built at the Boston navy yard, the hospital ship at the Philadelphia navy yard, and one gun-

boat at the Charleston, S. C., navy yard.

The crowded condition of the ship yards, combined with the high price of materials, indicates that the bids will be high. Both for patriotic and other reasons, confidence has been expressed that private builders will submit bids at the lowest possible figures, in face of the fact that the government is constantly becoming a stronger competitor. The act provides a bonus of 20 per cent over the contract price for the expeditious construction of vessels, and the

gained from the European war. Sixty-one of the vessels, including the capital ships, are to be under construction within six months from the day the naval bill was signed by the President, Aug. 29. On that day the bids were called for, the department being able to complete details for this purpose as the result of extremely hard work.

Admiral Benson's Statement

Admiral Benson, chief of operations, made the following statement with regard to the building program: "The battleships will be known for the present as Nos. 45 to 48 inclusive. They will be slightly larger than their predecessors, TENNESSEE and CALIFORNIA. Their chief characteristics are: Displacement, 32,600 tons; speed, 21 knots; battery, eight 16-inch guns, 18 5-inch guns, four 3-inch anti-aircraft guns; complement, 1,022 men. They will have the same large cruising radius which characterizes all recent United States battleships. Their armor protection and under water protection against torpedo attack will be unusually complete, and will include features which experience in the war has shown to be of the most vital importance.

"The scout cruisers, which for the present will be known as Nos. 4 to 7 inclusive, will be the largest and fastest vessels of this class ever laid down for any navy. The chief characteristics are: Displacement, 7,100 tons; speed, 35 knots; length, 550 feet; beam, 55 feet; armament, eight 6-inch guns, four torpedo tubes, and two 3-inch anti-aircraft guns; complement, 330 men. Their high powered machinery installations will be protected by light but efficient vertical and horizontal armor. A new feature of these vessels, never before incorporated in any ship of a first class power, will be their complete equipment for carrying, launching and operating four of the largest size hydroaeroplanes.

"The torpedo boat destroyers, until assigned names, will be known as Nos. 75 to 94 inclusive. Following their predecessors, these vessels will carry a very heavy battery, and will have an unusually large cruising radius for vessels of their class. They represent a small increase in displacement over the last class laid down, but will deliver an increased speed of about five knots. Their chief characteristics will be: Displacement, 1,185 tons; speed, 35 knots; battery, four 4-inch guns, four triple torpedo tubes, two anti-aircraft guns; com-

Seamen's Act Upheld

The La Follette seamen's act, as applying to ships flying foreign flags, has been upheld by United States District Judge Neterer, at Seattle, Wash., in a suit brought by John A. Clyma against the British steamship Ixion. Judge E. E. Cushman concurred in the decision of Judge Neterer, who denied that the law governing a maritime case must be determined by the ship's flag.

Clyma, a British subject, employed as a seaman on Ixion, demanded half the amount of his wages, due in accordance with the provisions of the La Follette law, when Ixion arrived at Seattle last May from the orient. The ship's master refused the demand, and Clyma then demanded his discharge and full payment for the wage due him, upon the refusal of which he filed a libel against the steamer.

Judge Neterer held that congress has the right to prescribe rules to govern a vessel and seamen within the jurisdiction of the United States and that such cases must be heard upon their merits under the United States laws.

department apparently thinks this provision will give impetus to work on the ships. The same provision applies with regard to government navy yards.

Designs for the battle cruisers, ammunition ships, and fleet submarines probably will be completed about Oct. 1, and bids for them are expected to be asked some time in December or January. The designs for all other craft are largely along previous specifications for similar types, although some changes have been made, based upon lessons

plement, 95 men. It will be noted that these vessels will attain their rated speed on their full assigned displacement, and not on a very much lesser displacement, which can only be attained by stripping the vessels of many essentials, as is the case in a number of foreign boats of this class, for which very high speeds are claimed.

Many Submarines Provided

"Of the coast defense submarines 27 will be of the usual type which have been built in this country for this purpose, but will include several new features tending to greatly improve their military value. These vessels will be known for the present as Nos. 58 to 104 inclusive. The remaining three submarines, Nos. 105, 106, and 107, will be of a new type, representing a marked increase in size over the usual coast defense submarine and a decrease in size from the very large fleet submarine. Each of these three vessels will represent different ideas in their detailed design, and it is hoped in their development to arrive at a size of vessel which will be sufficiently large to perform nearly all the duties required of a submarine, but at the same time to enable it to be built quickly in large numbers.

"The hospital ship will be the first vessel built specially for this purpose for the United States navy. The ones now in use for this purpose are converted merchant vessels. The design has been worked out by the technical bureaus of the department in constant consultation with the bureau of medicine and surgery, with the result that it will embody every feature of the most up-to-date hospital on shore. It will have accommodations for 500 patients. Its chief characteristics and dimensions are: Displacement, 9,800 tons; length, 460 feet; breadth, 60 feet 10½ inches; draft, 19 feet six inches; speed, 16 knots. As this vessel will be immune from capture or attack in time of war, under the terms of the Geneva convention, it will not, in accordance with the terms of that convention, carry an armament of any kind, for offense or defense, and in its design there are included no military features of any sort.

Fuel Ship of New Design

"The fuel ship, which will be known for the present as No. 16, will be a large oil tanker, of ordinary commercial type, except that in many features its design will meet the requirements for a vessel which must accompany the battle fleet and be prepared to supply fuel oil to vessels of all sizes under adverse conditions of wind and sea. Its chief dimensions and characteristics are: Displacement, 14,500 tons; length, 455 feet; beam, 56 feet; draft, 26 feet 4 inches

(about); total dead weight carrying capacity, 9,600 tons; speed 14 knots.

"The gunboat, which will be known for the present as No. 21, will be a type of vessel designed especially for long continued service in tropical waters. Its chief characteristics will be: Displacement, 1,575 tons; length, 241 feet 2 inches; breadth, 41 feet 2½ inches; draft, 11 feet four inches; armament, three 4-inch guns, two 1-pounder guns, four 0.30-caliber machine guns, two 3-inch guns, two 3-pounder guns; speed, 12 knots."

It is proposed to make the four battle cruisers the largest, and speediest craft that ever floated. According to tentative plans each will have a horsepower of 180,000, a minimum speed of 37 knots, electrically driven, four screws; each shaft will be three feet in diameter; length, 850 feet or more; bottoms to be built in cells, each of which is to be filled with fuel oil. Each cruiser will have no fewer than six bottoms.

What Will Shipping Board Do?

Plans for the vessels provided for by the ship purchase bill are also in a tentative stage. Until the shipping board is appointed and acts the exact type of vessels to be built as the result of this measure probably will not be known. It seems likely that most, or all of them, will have to be constructed, although the law gives the government the right to purchase them under certain restrictions that are practically prohibitive. The law appropriates \$50,000,000 to secure the vessels, and it is the opinion of administration officials that it will provide for approximately 50 ships, which will be naval auxiliaries, as well as merchant vessels. The law permits of their being built in foreign countries, or in private or navy yards of the United States. Present indications are that if construction of the ships is authorized in anything like the near future, private builders will be asked to do the work. Their is grave doubt, however, if the private yards could take the contracts and execute them promptly. It is a question as to how many of the vessels may be built and how many, if any, can be purchased in the open market. It is proposed that those which will be built shall be of a standardized type, each to have approximately 10,000 tons cargo capacity. It is contended by many who opposed the bill that the crowded condition of ship yards, and the high price of construction, will make it impossible for the government to get the vessels in the period it hopes to, or to obtain as many as administration officials say can be bought for the amount appropriated. It is also proposed that diesel engines shall serve as the power for some of the ships, while turbines will be used on others. Oil will be used as fuel.

Ore Shipments

The monthly record of ore shipments was again broken by the August movement of 9,850,140 tons, which was 99,983 tons in excess of the high mark set in July, when 9,750,157 tons were shipped. Total shipments for the season up to Sept. 1 aggregated 39,215,864 tons, an increase of 12,409,444 tons over the movement to Sept. 1, 1915. It is estimated that total shipments for the season of 1916 will easily reach the 60,000,000-ton mark. The movement from Sept. 1 to the close of the season in 1915 aggregated 19,512,384 tons, and in order to bring the 1916 total up to 60,000,000 tons, it will be necessary for the fleet from Sept. 1 to the close of the present season to carry approximately 20,800,000 tons. Considering the proportional monthly gains made so far in 1916 over 1915, it is believed this can be accomplished, and some shippers are estimating that the movement will be between 61,000,000 and 62,000,000 tons.

Following are the shipments by ports with comparative data for 1916:

Port.	August, 1915.	August, 1916.
Escanaba	933,162	1,061,285
Marquette	659,293	634,786
Ashland	931,142	1,289,439
Superior	1,375,086	1,950,249
Duluth	2,668,070	3,380,666
Two Harbors	1,514,364	1,534,315
Total	8,081,117	9,850,140
1916 increase		1,769,023
Port.	To Sept. 1, 1915.	To Sept. 1, 1916.
Escanaba	2,995,862	4,708,477
Marquette	1,773,653	2,469,705
Ashland	2,801,219	4,796,384
Superior	4,439,088	7,815,795
Duluth	9,378,530	12,718,548
Two Harbors	5,418,068	6,706,955
Total	26,806,420	39,215,864
1916 increase		12,409,444

Ore Receipts

Out of a total of 9,850,140 tons of iron ore shipped during August, 8,115,686 tons were received at Lake Erie ports, distributed as follows:

Port.	Gross tons.
Buffalo	1,167,120
Erie	197,727
Conneaut	1,520,019
Ashtabula	1,880,688
Fairport	469,350
Cleveland	1,686,502
Lorain	694,663
Huron	188,314
Toledo	273,186
Detroit	38,117
Total	8,115,686

Engineers have begun a survey of the Battery Park at New Castle, Del., which has been purchased by the Delaware Engineering & Ship Building Corporation, for a ship yard. It also has become known that General T. Coleman du Pont is interested in the new concern.

The capital stock of the company, which was first fixed at \$1,000,000, is to be increased to \$2,500,000. It is hoped to have the plant in operation within six months.

What the Government is Doing

Rulings on Marine Matters

Improvements to Waterways

Hints to Navigators

Seamen's Act Applied to Foreign Ships

THE United States bureau of navigation and steamboat-inspection service have jointly issued a circular, entitled "Certificated lifeboat men on foreign vessels", providing for the number of certificated lifeboat men to be carried on foreign vessels under the provisions of section 14 of the seamen's act and the method of obtaining certificates of efficiency for lifeboat men for such vessels.

It is provided that there shall be for each boat or raft a number of lifeboat men at least equal to that specified as follows: If the boat or raft carries 25 persons or less the minimum number of certificated lifeboat men shall be 1; if the boat or raft carries 26 persons and less than 41 persons the minimum number of certificated lifeboat men shall be 2; if the boat or raft carries 41 persons and less than 61 persons the minimum number of certificated lifeboat men shall be 3; if the boat or raft carries from 61 to 85 persons the minimum number of certificated lifeboat men shall be 4; if the boat or raft carries from 86 to 110 persons the minimum number of certificated lifeboat men shall be 5; if the boat or raft carries from 111 to 160 persons the minimum number of certificated lifeboat men shall be 6; if the boat or raft carries from 161 to 210 persons the minimum number of certificated lifeboat men shall be 7; and, thereafter, one additional certificated lifeboat men for each additional 50 persons, provided that one-half the number of rafts carried shall have a capacity exceeding 15 persons.

By "certificated lifeboat man" is meant any member of the crew who holds a certificate of efficiency issued under the authority of the secretary of commerce, who is directed to provide for the issue of such certificates. In order to obtain the special lifeboat man's certificate the applicant must prove to the satisfaction of an officer designated by the secretary of commerce that he has been trained in all the operations connected with launching lifeboats and the use of oars; that he is acquainted with the practical handling of the boats themselves; and, further, that he is capable

of understanding and answering the orders relative to lifeboat service.

In accordance with the law the secretary of commerce has designated the following officers to examine applicants for certificates as lifeboat men: Any commissioned or warrant officer of the United States navy who may be detailed for such duty by the commandant of any navy yard or the command-

men on foreign vessels issued by competent authorities of the countries to which such foreign vessels belong will be accepted as evidence that lifeboat men so certificated comply with the requirements of section 14 of the seamen's act. Such foreign certificates should certify that the lifeboat man has been examined in accordance with the provisions of the seamen's act and found competent. During the month of June, 1916, keepers of coast guard stations at Sturgeon Bay canal, Sturgeon Bay, Wis.; Jackson Park, Chicago; South Chicago, Chicago; and Michigan City, Ind., were specifically designated to assist in the examination of applicants for certificates of efficiency as lifeboat men, in addition to those previously designated.

Tender is Launched

The twin-screw gasoline-propelled lighthouse tender PALMETTO, under construction for the lighthouse service by the Merrill-Stevens Co., Jacksonville, Fla., was successfully launched recently. This vessel, when completed, will be assigned to duty in the sixth lighthouse district embracing part of the coast of North Carolina and the coasts of South Carolina, Georgia and part of Florida.

The hull is of the flat-bottomed type, constructed of steel, and has a length of 90 feet over all, a molded beam of 22 feet, and a depth of hold of 8 feet 6½ inches. Its displacement at 4 feet draft is approximately 170 tons. The propelling machinery will be two internal-combustion engines, using gasoline as fuel. The principal auxiliaries consist of one 2-cylinder gasoline engine driving an air compressor, a bilge and fire pump, and a fresh and salt water sanitary system.

The buoy deck forward is fitted with a three-drum gasoline hoist, with a derrick mast and boom having a lifting capacity of 3 tons. The living quarters of the vessel are to be steam heated.

ing officer of any vessel of the United States navy; commissioned officers of the line and warrant officers of the rank of boatswain or keeper in the United States coast guard; deck officers of the vessels of the lighthouse service, coast and geodetic survey, and the fisheries service; local and assistant inspectors of hulls in the steamboat-inspection service.

Certificates of efficiency for lifeboat

Fire Protection

The board of supervising inspectors of the United States steamboat inspection service has adopted a rule requiring casings or trunks for funnels, sheathing and water sprinkling systems, as a protection against fire, on certain steamers under the jurisdiction of the steamboat inspection service.

The rule reads:

"Steamers more than 150 feet in length under the jurisdiction of the steamboat inspection service, carrying passengers or passengers and freight and contracted for after June 30, 1916, shall have the funnel or funnels protected by an iron or steel trunk or casing extending through and past all decks above their connection with the boiler or breeching. If the engine room compartment extends above the main deck, it shall be protected through all decks by surrounding iron or steel bulkheads and by an iron or steel trunk extending through and past the upper deck.

"After Dec. 31, 1916, all steamers carrying passengers, and which also carry freight upon the main deck, which is accessible to passengers or crew, shall have such main deck freight space protected on the sides and overhead by a sheathing of sheet iron or steel, or of a substantial non-combustible material, or

shall have installed in lieu thereof an efficient overhead water sprinkling system. This paragraph shall not apply to steamers upon which the sides of the freight space are not inclosed, but upon such steamers the surface of wooden bulkheads and partitions and the overhead deck in such freight space shall be protected as above required, or there shall be installed in lieu thereof an efficient overhead water sprinkling system.

"The crew and passenger accommodations located below the main deck on steamers regularly engaged in the passenger traffic shall have installed therein an efficient overhead water sprinkling system. The water sprinkling system above referred to shall be reliable and efficient and so located that the volume of discharge shall be sufficient to entirely cover or blanket the freight in case of fire, or to entirely and fully sprinkle the compartment in which the passengers or crew may be accommodated below deck, and be installed in such manner as to be easily and quickly accessible of operation and shall be ready for service at all times when freight or passengers are on board."

Fire Alarms on Ships

The board of supervising inspectors has also adopted a rule, requiring that all steamers under its jurisdiction provided with staterooms or other sleeping quarters for passengers, where the vessels are more than 150 feet in length, and construction is contracted for after June 30, 1916, shall be equipped with an efficient fire alarm system or indicator which will automatically register, at some central point or station where it can be most quickly observed by the officers or crew of the steamer, the presence or indication of fire in the staterooms or various other compartments of the steamer not accessible to the observation of the officers or crew.

Hatches Must Be Covered

Beginning Sept. 1, all vessels were required to have their hatches covered before leaving port. It is figured that this work on the Great Lakes will take about three hours and will cause considerable delay to the lake fleet during the balance of the season. The dock men at some of the upper lake ports, it is understood, will assist in the work. The rule regarding the covering of hatch covers was amended last March to read as follows:

"It shall be the duty of the master of any vessel under the jurisdiction of the steamboat inspection service, and which is carrying cargo, to assure himself before leaving port, that all of the cargo hatches of his vessel are properly covered and the covers se-

cured. The covers of all exposed cargo hatches shall be made watertight by fitting to pliable gaskets, or by being thoroughly covered with hatch cloths or tarpaulins firmly secured by iron or steel bars extending from side to side or end to end of hatchway, which bars shall be fastened by toggles or wedges of hard wood or by efficient screw fastenings. Wooden hatch bars of sufficient size or strength already installed and maintained in good condition may be accepted in lieu of the iron or steel bars above referred to: Provided, That steamers having 6 feet or more of freeboard, measured vertically from the water's edge at the lowest point of shear to the top of deck at the ship's side, will not be required to use the hatch cloths or tarpaulins between March 31 and Aug. 31. This exemption, however, does not relieve the master of any responsibility for the security and protection of his hatches during the interval of exemption, and in case of indications of bad weather or other threatening conditions, he shall not leave port until

the hatches are properly covered, secured and protected. Failure by the master of any vessel to observe this regulation shall be sufficient cause for suspension of his license on a charge of inattention to his duty."

New Coast Pilot

The United States coast and geodetic survey, department of commerce, has issued a new edition of the United States Coast Pilot, Section C, which covers the coast from Sandy Hook to Cape Henry, including Delaware and Chesapeake bays. This volume, which replaces Coast Pilots V and VI, has been changed to octavo size and rewritten largely from new data. Its scope has been considerably extended, especially by the introduction of information of value for the use of small craft. Some new features are presented, including tables of courses and distances, a table of dry docks and marine railways and a table showing the average number of hours per month that fog signals are operated. No effort has been spared to make this volume a useful aid to navigation.

Conference on Loadlines

SECRETARY of commerce Redfield has asked about 40 of the leading American ship builders, presidents and general managers of principal American steamship companies, and naval architects to meet at his office Sept. 27, for an exchange of views on the subject of loadlines and bulkheads and on other phases of the construction of steamers on the ocean and the Great Lakes as related to those two subjects.

In a notice sent out by the department of commerce it is stated that the United States is almost alone among maritime nations in having no regulations governing loadline. Our fleet of ocean cargo carriers is growing so rapidly that this subject cannot longer be postponed—indeed already during the European war American ships have been saved from embarrassment and delays to commerce for lack of loadline regulations only by resort to temporary expedients.

The subject of bulkhead and hull construction was carefully considered at the London International Conference on Safety of Life at Sea and the American delegates had an important part in framing the chapters of the international convention on that subject. The United States has as yet taken no steps to give effect to these portions of the international convention. The subject is difficult and our future as a ship building and maritime

nation is involved in a right beginning along proper lines. Among those asked to the meeting are:

Alfred Gilbert Smith, president, New York & Cuba Mail Steamship Ship Co., Pier 13, East River, New York.

P. A. S. Franklin (receiver), International Mercantile Marine Co., 9 Broadway, New York.

George J. Baldwin, president, Pacific Mail Steam Ship Co., Room 110, 55 Wall street, New York.

Andrew W. Preston, president, United Fruit Co., 131 State street, Boston.

H. H. Raymond, president, Clyde & Mallory Lines, Pier 36, North River, New York.

J. H. Jenkins, president, Merchants & Miners Steam Ship Co., Light and German streets, Baltimore.

Capt. C. W. Jungen, manager, Southern Pacific Steam Ship Co., Pier 49, North River, New York.

W. H. Pleasants, president, Ocean Steam Ship Co., Pier 35, North River, New York.

Joseph P. Grace, Wm. R. Grace & Co., Hanover square, New York.

J. Pluymert, technical adviser, Standard Transportation Co., 26 Broadway, New York.

George F. Dearborn, president, American-Hawaiian Steam Ship Co., 8 Bridge street, New York.

Edgar F. Luckenbach, Luckenbach Steam Ship Co., 8 Bridge street, New York.

William Livingston, president, Lake Carriers' Association, Detroit.

Homer L. Ferguson, president, Newport News Shipbuilding & Dry Dock Co., Newport News, Va.

Samuel M. Knox, president, New York Shipbuilding Co., Camden, N. J.

J. W. Powell, president, Fore River Shipbuilding Corporation, Quincy, Mass.

M. E. Farr, president, American Shipbuilding Co., foot of West Fifty-fourth street, N. W., Cleveland.

Antonio C. Pessano, president, Great Lakes Engineering Works, Detroit.

J. V. Paterson, president, Seattle Construction & Dry Dock Co., Seattle, Wash.

J. A. McGregor, president, Union Iron Works, San Francisco.

Frederick W. Wood, president, Maryland Steel Co., Sparrows Point, Md.

H. B. Walker, president and general manager, Old Dominion Steam Ship Co., Pier 25, North River, New York.

Henry S. Grove, president, Wm. Cramp & Sons Ship & Engine Building Co., Philadelphia.

Franklin D. Mooney, president, American

Steam Ship Association, 11 Broadway, New York. (Also president New York & Porto Rico Steam Ship Co.)

W. G. Cox, president, Harlan & Hollingsworth Corporation, Wilmington, Del.

Chief Constructor David W. Taylor, U. S. N. Bureau of Construction and Repair, Navy Department, Washington, D. C.

Chief Constructor W. L. Capps, U. S. N. Bureau of Construction and Repair, Navy Department, Washington, D. C.

Stevenson Taylor, president, American Bureau of Shipping, 66 Beaver street, New York.

Prof. C. H. Peabody, Massachusetts Institute of Technology, Boston.

Prof. H. C. Sadler, University of Michigan, Ann Arbor, Mich.

Frank E. Kirby, Biddle avenue, Wyandotte, Mich.

W. L. Babcock, 17 State street, New York.

Irving Cox, 15 William street, New York.

Theodore E. Ferris, 30 Church street, New York.

Dr. S. W. Stratton, director, Bureau of Standards, Department of Commerce, Washington, D. C.

Geo. Uhler, supervising inspector general, Steamboat-Inspection Service, Department of Commerce, Washington, D. C.

E. T. Chamberlain, commissioner of navigation, Department of Commerce, Washington, D. C.

E. F. Sweet, assistant secretary of commerce, Washington, D. C.

barely permits them to obtain a government license.

Draft of Ships in Canal

In order to calculate the draft of a ship in the fresh water section of the Panama canal, through Gatun lake, Gaillard cut, and Miraflores lake, from her draft in sea water, the marine division forces have adopted as a working formula:

Add one-fourth of an inch for each foot of draft in sea water.

Accurate computation in this matter would require consideration of the displacement curve of the ship and the density of the water, as determined by hydrometer tests; but for practical purposes the simple formula is very satisfactory.

Where the water plane area is approximately constant throughout the draft, the draft of a ship in fresh water is about 3 per cent greater than in salt water. This is based on the ratio of the volume of water weighing one ton. A ton of clean fresh water contains approximately 36 cubic feet; a ton of clear sea water in the open ocean, approximately 35 cubic feet. The depth to which a vessel will sink, displacing water, till it reaches equilibrium will vary as the quantity of water required to make a ton. Accordingly, as 36 is greater by 2.857 per cent than 35, the draft of a rectangular parallelepiped in fresh water is exactly 2.857 per cent greater than in salt water. One-fourth of an inch is slightly over 2 per cent of a foot; but on account of the sediment in the water in the cut, due to the dredging operations, and also on account of the fact that the water plane areas are smaller near the keel than near the surface, the local formula gives more nearly accurate results with respect to passage through the cut than the usual forms of rough calculation.

Compression Test

An important test was conducted recently by the United States bureau of standards to determine the ultimate strength of a cast-iron keel block. As designed, the block was expected to withstand a load greater than could be exerted by any testing machine in existence. It did withstand the full capacity of the bureau's testing machine (10,000,000 pounds) when the load was applied over the entire bearing surface of the block, but when the load was applied over part of its bearing surface it failed at 9,600,000 pounds.

The test of the block itself was preceded by several preliminary tests to determine the strength of oak timbers,

which are usually placed between keel blocks and the keel of the ship. At loads from 300,000 to 800,000 pounds the timbers were completely shattered, the variation in the load depending entirely upon the variation in the area over which the load was applied.

After these preliminary tests the keel block was subjected to a load equal to the capacity of the machine. At about 6,500,000 pounds several sharp reports were heard, but after the full load was applied there was no apparent damage to the exterior of the block. On dismantling it, however, it was noticed that several of the webs of the various sections were cracked. It was then re-assembled, and the load applied over a smaller area when it failed at 9,600,000 with a very loud report and the almost complete shattering of the various sections, throwing parts of them to a distance of 12 feet.

Ruling on Fusible Plugs

The executive committee of the board of supervising inspectors of the United States steamboat inspection service has adopted a rule eliminating the requirements for reduction of area of steel boiler plate, pending an investigation by the bureau of standards.

The requirements referred to and which were eliminated were contained in the first paragraph of section 5, rule 1, general rules and regulations of the board of supervising inspectors. The paragraph as amended reads as follows:

5. When the tensile strength determined by the test is less than 63,000 pounds, the minimum elongation shall be 25 per cent for plates $\frac{3}{4}$ -inch and under in thickness and 22 per cent for plates over $\frac{3}{4}$ -inch in thickness. The quench-bend specimen shall bend through 182 degrees around a curve, the radius of which is three-fourths the thickness of the specimen. When the tensile strength determined by the test is 63,000 pounds or greater, the minimum elongation shall be 22 per cent for plates $\frac{3}{4}$ -inch and under in thickness, and 20 per cent for plates over $\frac{3}{4}$ -inch in thickness. The quench-bend specimen shall bend through 180 degrees around a curve, the radius of which is one and one-half times the thickness of the specimen.

The executive committee has, also, in the interests of safety, amended the rules for fusible plugs by requiring that the tin with which the plugs are filled shall not be less than 99.7 per cent pure, in lieu of 99.5 per cent.

Baton Rouge, capital of Louisiana, and only recently created a port, has officially received and cleared its first ship, the Standard Oil Co.'s tanker, JOHN D. ROCKEFELLER.

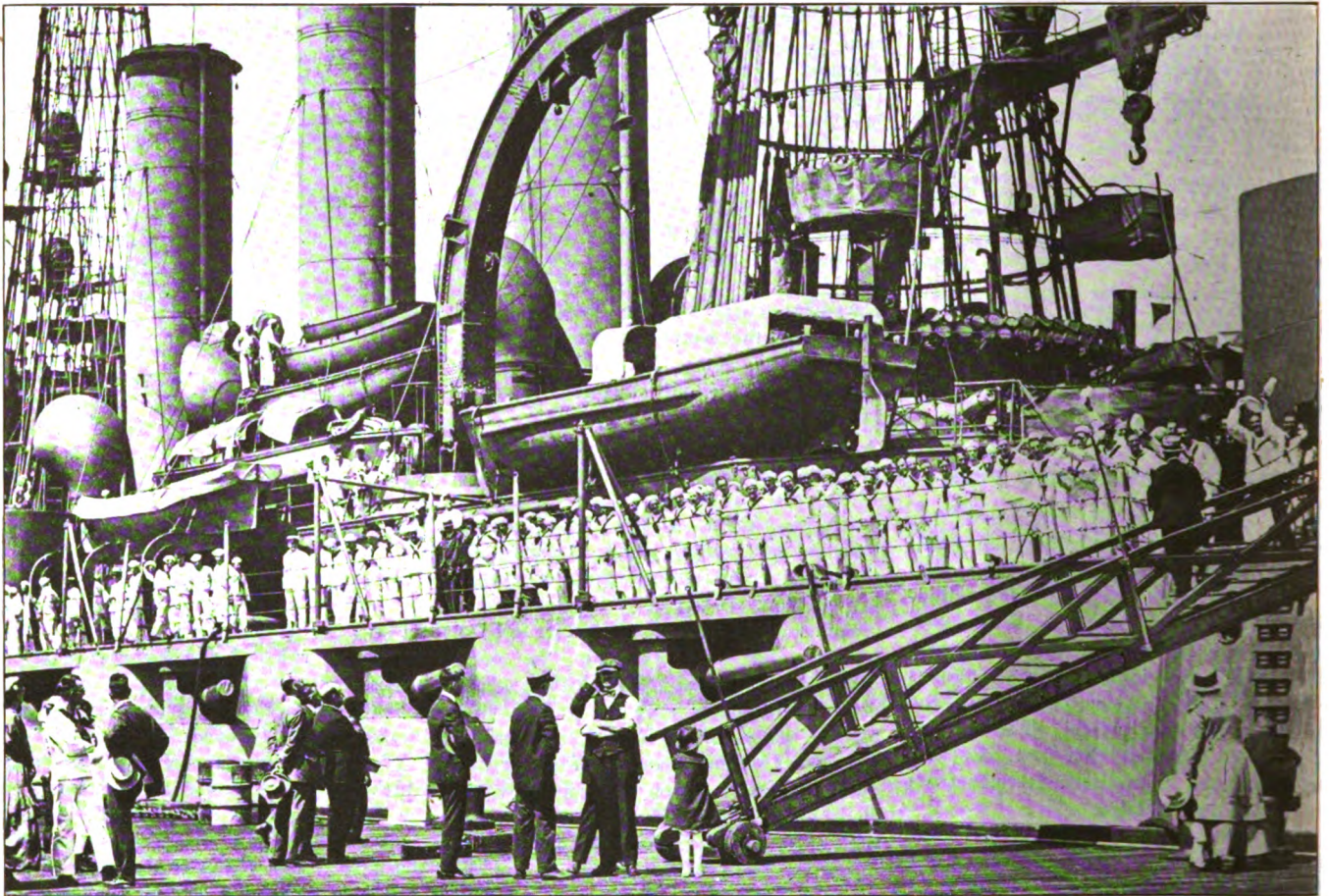
Emergency Radio Sets

The department of commerce has issued a circular letter calling the attention of wireless operators to the need of providing spare parts to their equipment for use in case of breakdown. An instance is cited in which a coast-wise vessel was forced to go two days without radio service because of the lack of a detector crystal. The circular points out further that the operator was unable to improvise a detector from the materials available.

A condition in which the wireless apparatus becomes useless on account of the lack of a spare detector crystal is not healthy. That such a condition exists, however, reflects no credit on the operator himself, the company which trained and employed him or the naval examiner who granted him his certificate. The point concerned is the inability of the operator to improvise a simple detector of sufficient sensitivity and reliability to maintain communication. Does this condition which is described in the department circular result from a superficial training of the operator, enabling him to understand only the workings of the modern apparatus and neglecting entirely the theory which is exemplified so plainly in instruments of earlier design?

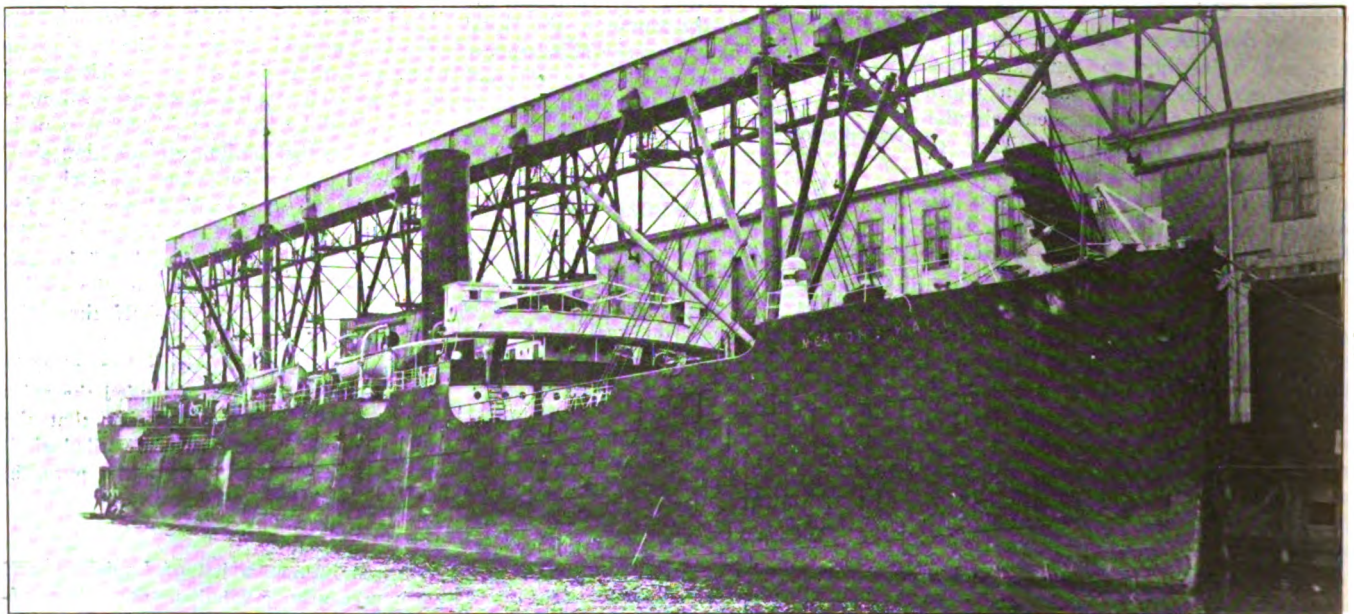
Had the operator, who was forced to sit idly with his lifeless receiver, known what simple materials were used in the pioneer instruments, he might have taken a piece of carbon from a worn-out dry cell, a needle or piece of iron wire or a number expedients as easily procurable and rigged up a microphonic detector which would have been capable of receiving signals for a radius of nearly 200 miles. A student of wireless literature would never be at loss for a substitute detector. Wireless operators on ships should have a training far better than that which

Photographs From Far and Near



THE CRY OF "TRAIN THE CIVILIANS" HAS BEEN HEEDED

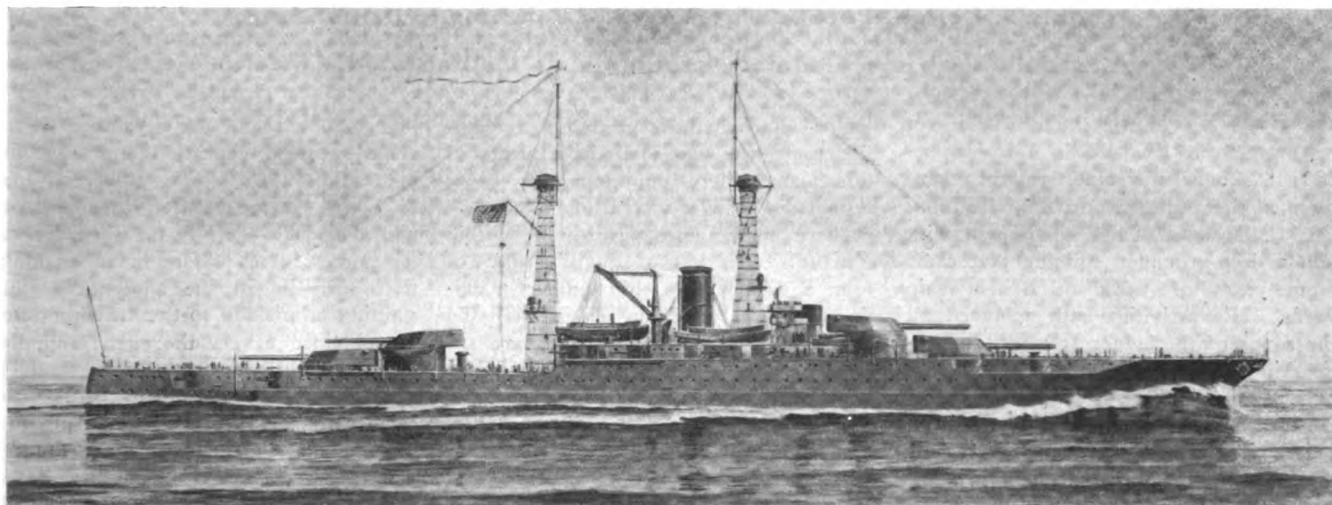
Last summer a civilian military training camp was held at Plattsburg, N. Y. In charge of competent army officers, this camp was an unquestioned success. The accompanying photograph shows the battleship VIRGINIA and her newly acquired citizen crew eager for the month's training at sea.



HAMMERED AND BRUISED BY AN INDIAN TYPHOON

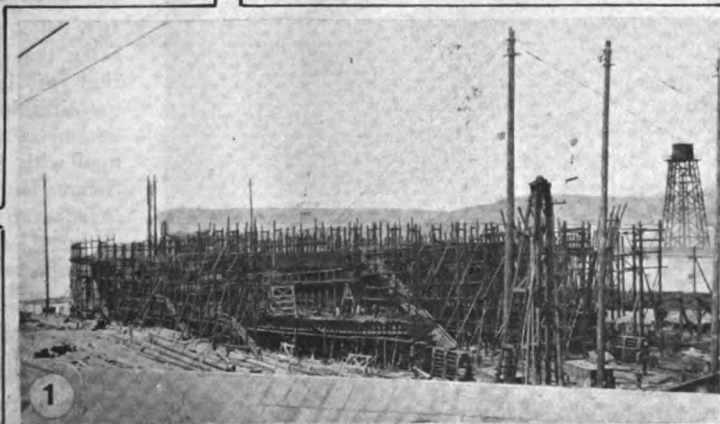
Enroute from Calcutta with a valuable cargo of skins, indigo and tea, MERTON HALL, encountered terrific weather. The breaking seas kept her decks awash and the seepage through the battened hatches seriously damaged the cargo. She is shown in the illustration docked at Durban, S. A.

Latest Marine News in Pictures

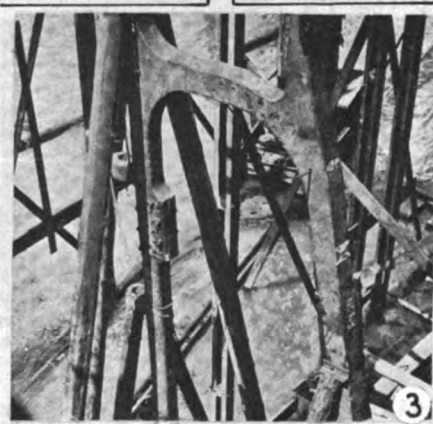


A HARD-HITTING GREYHOUND OF THE BATTLE FLEET

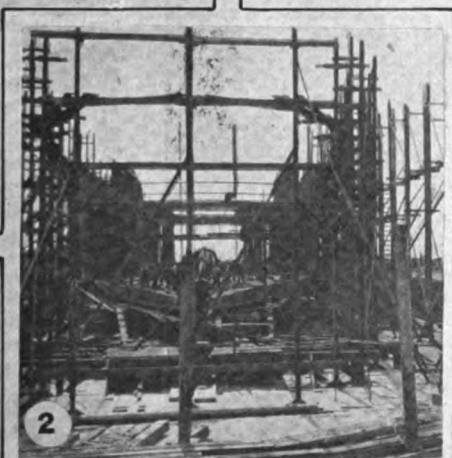
Building at the New York navy yard, New Mexico embodies a number of unusual features. The cutaway bow construction is of peculiar design, and gives this ship the appearance of a pleasure yacht rather than an oil-burning, electrically-driven battleship of the super-dreadnaught class. New Mexico will cost complete \$14,500,000, and will carry 12 14-inch rifles and will be turned over to the government in 1918.



1



3



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SEATTLE, QUEEN CITY OF THE PACIFIC COAST, IS FAST BECOMING THE SHIP BUILDING CENTER OF THE NORTHWEST

- (1) Two ships under construction. Aerial cableway is used to place beams and channels. (2) Stern view of vessels under construction. (3) Steel casting of 48-foot stern frame. (4) A general view of the Skinner & Eddy ship yards, showing plate and shape storage in the foreground.

An English Ship Builder in Canada

John S. Leitch, Fortified by Years of Training in British Yards,
is Solving Unaccustomed Problems at Collingwood, Ontario

WHEN John S. Leitch came over from England in 1912, to become assistant general manager of the Collingwood Ship Building Co., Collingwood, Ont., he brought with him a deep-grounded training that came from years of work in British ship yards. His activities had embraced all the rungs of the ladder from an apprenticeship to the assistant managership of one of the big yards at Belfast, Ireland. Many of the problems that Mr. Leitch has encountered and solved at the Canadian yard are apparently entirely foreign to those problems which his early training equipped him to face. While his experience as a ship builder and marine engineer had been wide and varied, the bulk freighter that plies the Great Lakes is a type peculiar to those waterways. The reconstruction of the steamer HOWARD M. HANNA JR., badly hogged in the big November, 1913, gale, bore little resemblance to any job that he had handled abroad. The greatest test came, however, at the opening of the European war, after Mr. Leitch had been in full charge of the plant for some time. The necessity for furnishing aid to the mother country caused the company to embark in the manufacture of shells. The plant had to be considerably altered, complete equipment installed and full machine-room crews developed from unexperienced hands. That Mr. Leitch mastered this prob-

lem, as he had those preceding, is testified to by the two shell departments of this plant where munitions are being turned out in ever-increasing numbers.

The examples cited furnish the visible signs of the inherent qualifications of John S. Leitch as a ship builder, a marine engineer, and an executive. To his associates, these testimonials are superfluous. They are merely confirmatory of what that association has already taught, that he measures up fully to the big job he fills.

Born of Scottish parents in New York, in 1880, John Shearer Leitch was, owing to the death of his father, sent over to Portpatrick, Scotland, where he spent

his childhood and early youth. He received a good education and was then apprenticed to Messrs. Robert Napier & Sons, Govan. After spending two and a quarter years in the yard, he was the successful candidate in an examination open to all the apprentices, thus gaining admission to the drawing office. He obtained a very thorough grounding in ship yard work at Govan, both in the drawing office and in actual ship construction in the yard. His practical work during the day was augmented by attendance at classes in naval architecture, mathematics, and other subjects in the evenings and by arduous study, which, at the end of his apprenticeship,

enabled him to start upon his career with much more than average qualifications. In 1901, shortly after the completion of his apprenticeship, he became a draftsman with Messrs. Swan, Hunter & Wigham Richardson, Ltd., at their Neptune works, Walker, on the Tyne, and further augmented his Clyde experience. While at the Neptune works he took an active part in the construction of a large variety of passenger and cargo vessels, cable-laying steamers, etc. On arriving at Tyneside he immediately resumed his studies, first at the Walker Mechanics' Institute and later at the Rutherford College, Newcastle, and was successful in passing the honors examination in naval architecture at South Kensington, London. Mr. Leitch would be the last to deny



JOHN S. LEITCH
General Manager, Collingwood Ship Building Co.

that he owes much of his success to the experience he gained on the Clyde and Tyne, for in these premier ship building centers of the world he was wide awake to the possibilities of absorbing the methods of management that had helped to make the two firms with which he was connected so highly successful. He was not content, however, to remain on the Tyne, and, after having been in the employ of Messrs. Swan, Hunter & Wigham Richardson, Ltd., for four years, he went to Belfast to take charge of an important department in the drawing office of Messrs. Workman, Clark & Co., Ltd. In this position he was actively engaged in the building of vessels for many of the large British ship owning concerns, including the Royal Mail Steam Packet Co., Orient line, Messrs. Lamport & Holt, British India Steam Navigation Co., Star line, United Fruit Co., Boston, Messrs. Elder, Dempster & Co., Ellerman Lines, Harrison Line, etc. His duties also placed him in close touch with the superintending captains and engineers of these various companies, and gave him an excellent opportunity for absorbing the ideas of men of large and varied experience.

Has Extensive Commercial Knowledge

A knowledge of the commercial methods of a large ship building concern is a great asset to the technical man who aspires to be a leader, and Mr. Leitch was fortunate in being continually in contact with the purchasing and other clerical departments, the importance of such knowledge being readily recognized by him and taken full advantage of. His efforts in the drawing office at Belfast were rewarded by his being appointed assistant manager. When the directors of the Collingwood Ship Building Co., Ltd., Collingwood, Ont., offered him the important executive appointment of assistant general manager he readily accepted their proposal, and, after serving in this capacity for three years, his services were recognized by promotion to the responsible position of general manager. Mr. Leitch arrived in Collingwood in July, 1912; and, although at that date the Collingwood firm was one of the leading ship building, marine, engineering and ship repairing concerns in the dominion, the period that has elapsed since he took up his work in Canada has been one in which considerable further prestige has been gained by that establishment.

Founded many years ago to build wooden ships, the Collingwood Ship-Building Co. was recognized in 1905, and has developed since that date along up-to-date lines. In addition to six commodious and well-equipped building berths, the sphere of this concern's activities includes engine and boiler shops, a foundry, two excellent dry docks, and

the customary buildings necessary for a modern establishment of this kind. Mr. Leitch is responsible to the directors for the control of the entire plant, a somewhat unique position considering the fact that in most of the British ship yards a dividing line is usually drawn between the ship building and engineering departments.

Unique Vessels Built at Collingwood

When attention is turned to the kind of vessels turned out at Collingwood, it is found that a number of interesting types have been constructed and fitted with propelling machinery. Among these are 550-foot bulk freighters, lighthouse and buoy tenders, passenger steamers, ordinary cargo carriers and bucket dredges and hopper barges for the Canadian government. At present three oil-tankers, suitable for lake or ocean service, are under construction, and two more are on order to be used exclusively for salt water; while a bulk freighter, 550 feet long by 58 foot beam and 31 feet deep, is also on the stocks.

The repair department, also handles a great deal of work. One of the most noteworthy of the repair jobs consisted in straightening and reconstructing HOWARD M. HANNA JR., a freight steamer seriously damaged during the great gale of November, 1913. This vessel is 480 feet long, 54 feet wide and 26 feet deep. She was driven on Austin reef. Here she remained all winter, and, owing to excessive pounding, finally broke in two amidships down to the tank top. A wrecking company took the vessel off in the spring, and, after temporary repairs, she was taken to Collingwood and docked for examination. It was found that she was hogged about 2 feet, with the bottom completely stove in from the forefoot to within 100 feet of the stern. The steamer was removed from dock and heavy hardwood cribs were built to accommodate the forefoot and stern, these being the only bearing points. She was then redocked, the temporary patches removed from the upper works, and pumping commenced. It was found that as soon as the water began to leave the dock the vessel commenced to come down amidships and the hog to disappear. In order to determine when the normal sheer had been regained, the offsets were secured from the builders and sights ranged on either side, so that when the sights were level the ship had regained her original form. Pumping was then stopped and heavy shores placed under the plate edges to hold her until the dock was emptied and shores could be placed underneath the bottom. Practically the whole of the bottom had to be renewed.

At the opening of the European war Mr. Leitch launched forth on what was

for him an entirely new departure—the production of shrapnel and high-explosive shells. In turning from the construction of propelling machinery to the making of munitions, the demand naturally arose for considerable alteration in the arrangement of the existing plant, and also for additional equipment. Notwithstanding this, however, the management was equal to the occasion and two thoroughly efficient shell departments were quickly organized. These were worked by men, the majority of whom had never been in a machine shop previously, trained mechanics not being available, while the ordinary marine-engine construction was at no time seriously handicapped. To accommodate the shrapnel plant, part of the floor of the machine shop was equipped with the necessary machinery, and the floor or gallery immediately above was also utilized. The equipping for high-explosive shells entailed the remodeling of the large power-house building.

Book Review

The Year Book of Wireless Telegraphy and Telephony, edited and published by the *Wireless Press*, Ltd., London, Eng.; distributed in the United States by the Marconi Publishing Corporation, New York; 890 pages, 5 x 8 inches, bound in cloth and furnished by *The Marine Review* for \$1.50.

This new volume on wireless telegraphy, which is nicely illustrated, is one of the most complete books of its character that has ever been published. The opening pages of the book are confined to a sketch of the development of wireless telegraphy and a report of the international radio-telegraphic convention which includes a list of abbreviations adopted by the members for use in radio-telegraph transmissions. A large part of the book is devoted to the laws and regulations of various countries concerning wireless stations and operators. Particularly noteworthy, however, is a list of the wireless telegraph stations of the world which includes the location, call signal and other information concerning each station. The list is accompanied by a map of the world showing the location of the stations. A second division of the list gives similar data for ship stations. The stations are classified geographically and according to their call letters. The remainder of the text contains several interesting articles on important phases of wireless development and theoretical means of computation. A glossary of terms and other information for those interested in wireless telegraphy also is presented.

The Boston schooner CHARLES D. LOVELAND has been chartered on private terms to carry coal from Philadelphia to Paramaribo.

Duluth Harbor Needs Breakwater

Resume of Report of Alexander McDougall, Chairman of the Harbor Committee of the Duluth Commercial Club, Describing Dangers to Navigation

THE need of a suitable breakwater to protect the harbor at Duluth has been apparent for some time to ship masters and others familiar with the ports of the Great Lakes. Although this port has a splendid harbor, the currents which arise in the entries during storms make navigation difficult and not without danger.

A review of the local conditions gives a clearer understanding of the situation. Lake Superior is 400 miles long, 150 miles wide and in some places has depths as great as 1,000 feet. Due to this great depth, the sea runs very high when a storm sweeps the lake. The west end of the lake is funnel shaped with deep water extending to the extreme tip of the funnel. The shore line for 150 miles north of Duluth offers no safe harbor; on the south shore, the nearest shelter is at the Apostle islands. Anchorage is impracticable due to the depth.

The excellent natural harbor at Duluth has been an important factor in the growth of the city as a lake port. During the last 40 years the ship tonnage has increased to more than 40,000,000 tons a year, Duluth ranking next to New York as the largest tonnage port in America. Duluth has now, completed or in course of construction, seven trans-continental railroads that have direct connections with the Pacific coast. There are registered in Duluth 480 ships, of about 100,000 tons gross registered tonnage or about 1,500,000 tons carrying capacity, which cost about \$60,000,000. The port terminals, docks and cargo-handling machinery are valued at \$33,000,000. This equipment furnishes the greatest facilities for loading and unloading cargo of any port in the world. It is a common occurrence to load a ship of 10,000 tons in two or three hours, or to unload the same ship in less than 10 hours.

Sandbar Obstructs Harbor

At present, entrances to the harbor are located at Duluth and at Superior, either of which is safe in moderately rough weather. A long narrow strip of sand, which was formerly a sand bar, lies across the end of the lake. It extends for 10 miles in a north and south direction, one end connecting to Minnesota and the other to Wisconsin. A narrow channel is cut through it near the Minnesota end and another close to the Wisconsin shore. The two channels are about 6 miles apart. This sand strip encloses approximately 16 square

miles of an inside harbor with dock room, if all cut into slips, to make 1,000 miles of dockage accommodations.

Only one-fourth of the shipping to Duluth consists of west bound cargoes, mostly coal and merchandise. Consequently many ships go up without cargo and are not as seaworthy as when loaded. Many loaded ships, when the weather is threatening, follow a course near the north shore which has deep water close to the very high land. Many fog signals and lighthouses, as well as lights on the shore, help to guide boats toward the Duluth entrance. If the ships are on the regular course for the Superior entrance, they pass about 25 miles from Grand Marais, 20 miles from Split Rock and 12 miles from the Two Harbors' lighthouse and fog signals. The south shore has no lighthouses or fog signals from the Apostle islands to Superior; the shore line is low, providing no protection.

During a storm, the water in the bays and the ports rises and falls similar to tides. The most noticeable change of level is observed at the west end of Lake Superior due to the size of the lake and the funnel shape of this end of the lake. During severe northeast storms, this change in level may be 2 or 3 feet, with the currents in the channels averaging from 5 to 8 miles an hour.

At the entrances to many harbors, the shallow water extending into the open is of such depth that it breaks up the large waves to some extent. At the west end of Lake Superior, however, the soundings show deep water, 100 feet or more, close to the harbor entrance, so that at the Duluth entry, the great waves carry to the pier. Here the strong current, if running out, meets the waves coming in, at the place where the deep and shallow water adjoin about a ship's length from the entrance, and this with wind, wave and current make a terrible disturbance of water. It seems impossible for large ships to enter as they may settle between the waves and touch bottom, their rudders may not control the boat or they may strike the stone piers and sink in the entrance as did the steel ship MATAFA. A number of the big steel ships which accompanied this vessel were afraid to try the entrance in such storm. They tried to turn around and could not head the sea so they went ashore close to Duluth.

In the fall of the year it sometimes happens that 100 west bound ships, dur-

ing a severe northwest storm, are in shelter near the Soo, Whitefish Point, Marquette and Keweenaw Point. When the wind slackens they continue their course. Now suppose that such a fleet, when near the west end of the lake, is overtaken by a northeast snow storm and one of the ships meets the current running out at the Duluth entrance and among the high waves she strikes the bottom, or the piers, and sinks as several ships have done in the past. The following ships coming on after her do not receive any warning, making possible the worst kind of a calamity.

Four years ago I visited the great breakwater at Cherbourg harbor, France, the great breakwater harbor at Dover, England, and also the breakwater at Portland Head, south of England, to get information on the subject of breakwater construction and endurance. The breakwater at Portland Head was of the type needed at Duluth. It was built on a sand and gravel foundation. On top of this was a great row or mass of loose rock in about 50 feet of water, the largest and best being used for the weather side and top, much like the plan of laying the rock at the Superior entry breakwater, and as proposed for the Duluth breakwater. This breakwater stands the abuse of the North Atlantic and it fully convinced me that the plan for the Duluth breakwater is satisfactory.

The Proposed Breakwater

The stone used for the Portland Harbor breakwater was limestone, much lighter than our trap and granite rock adjacent to the shore end of what will be the Duluth breakwater. This stone may be carried to the breakwater from the quarry by gravity or by railroad. This breakwater should run from the rocky shore near Twenty-first avenue east, and at about right angles to the north shore. It should parallel Minnesota Point for about 7,000 feet so that it will overlap the Duluth harbor entrance and shelter it from northeast storms. On the outer end of this breakwater a good lighthouse and fog whistle should be built, so all ships enroute to Duluth and Superior could easily be guided along the north shore and close to the end of this breakwater and then through the Duluth entrance regardless of the current. They could also come to anchor under the breakwater in a harbor a mile and a quarter square with room for a great fleet of 500 and 600-foot ships.

In the Traffic Manager's Office

A Review of the Month on Coasts and Lakes—Useful Pointers
for the Men Who Get the Business

War Cuts Carrying Capacity 50 Per Cent

THE war has reduced the carrying efficiency of the world's mercantile marine 50 per cent, according to estimates recently made by English authorities. When one places this reduced capacity alongside the greatly increased volume of trade to be carried, a clear insight is obtained into the basic cause of present soaring freight rates.

The problems which the British ship owner has had to face were described recently by the London *Economist*. It is stated that in this war British ship owners have had to contend with great difficulties, many of them unforeseen. For nearly 18 months merchant shipping has been considered a fair mark by German submarine commanders and the U boats make the protection of commerce in war time a more complicated business than it has ever been before. But the main difficulties of ship owners have arisen from scarcity of labor ashore and afloat, the restriction of building and the high price of materials, and above all, from the requisitioning of the government, which has taken over 50 per cent of British registered tonnage for the needs of the navy, the army and the allies.

If, however, the ship owners' difficulties have been serious, their opportunities have been infinitely greater. Owing to the volume of goods wanted by the fighting forces and to the amount of tonnage withdrawn from ordinary commerce, freights have risen to a level hitherto unimagined, and the price of old tonnage is about three to four times what it was in days of peace. Exact quotations of all freight markets cannot be given, but the following figures indicate closely enough the course taken since the outbreak of war:

	Home- wards Plate.	Home- wards Ka- rachi.	U. S. French Atlan- tic.	Tyne Genoa.	Tyne Rou- en.
	s d	s d	s d	s d	s d
July, '14	15 0	12 6	3 0	7 6	...
Dec., '14	35 0	17 0	4 3	19 0	12 0
June, '15	50 0	45 0	8 6	26 6	16 0
Dec., '15	120 0	105 0	16 6	66 6	22 0
July, '16	160 0	80 0	13 0	70 0	27 6

It will be seen that while freights rose from the beginning of the war, the

sharpest upward movement took place about the middle of 1915, and it was this sensational rise that forced the government to take action for the control of the shipping industry. The rise came when it did because the center of activity on land shifted suddenly from western Europe to the Balkans, and the navy, in addition to its former duties, had to transport, safeguard and supply big allied armies in the eastern Mediterranean. To carry out this work they requisitioned right and left, and the more they requisitioned the more freights rose.

Steamers Come High

The rise in freights was accompanied naturally by a rise in the price of tonnage, and extraordinary figures have recently been fetched by steamers, especially smaller and older steamers, that the admiralty does not covet for its own use. For instance, a small steamer of 350 tons gross, built in 1904, and suitable only for the coasting and continental trade, changed hands a short time back at \$75,000, the price working out at over \$200 a ton gross and \$500 a ton net. In peace times, if she had sold for \$60 a ton, she would have made a good enough bargain for her owners, so that the rise in her value is quite fantastic.

In view of such facts and figures it is clear that the reduction in available tonnage must have been enormous, and, though no exact statistics can be obtained, we may arrive at an approximate estimate of what the reduction is. In July, 1914, the steamers—British, colonial and foreign—on Lloyds Register represented a net tonnage of 24,809,234, of which 11,500,000 were British owned. To this sum of 24,800,000 must be added an amount for new tonnage, less tonnage broken up—say 800,000. Then we must deduct enemy shipping, less the boats commandeered and captured, steamers lost from war and marine risks, the allied and neutral steamers imprisoned in the Black Sea and the steamers requisitioned by the government—say 60 per

cent of British tonnage. The estimate would work out as follows:

	Net tonnage.
Lloyds Register, July, 1914.....	24,809,000
*Estimated new tonnage.....	800,000
Total	25,609,000
Deduct—	Net tonnage.
*War losses	1,520,000
*Marine losses	550,000
Black sea	134,000
*Enemy steamers	3,320,000
Estimated requisitioned.....	6,927,000
	12,451,000
Available tonnage	13,158,000
*Partly estimated.	

On this estimate the steamer tonnage suitable for ordinary commerce is rather less than 60 per cent of the tonnage available two years ago, and the reduction in carrying power is really greater than appears from the table, because the time spent in loading and unloading is far greater under war than under peace conditions. A steamer that can do a round voyage in one week is worth three that take three weeks, and, owing to the congestion of traffic and shortage of labor, it may be assumed that the carrying efficiency of the world's mercantile marine at present is actually less than 50 per cent of the normal.

It is clear that normal rates for shipping cannot prevail, and no heroic measures for reducing them would be effective. All sorts of schemes have been suggested, and a strong movement was on foot last year to make the government commandeer all British tonnage and manage it as a government industry—a plan that experience with admiralty requisitions scarcely recommends. What the government has done is to restrict imports, to institute and extend a system of licenses, and by a number of expert committees to control generally the movements of shipping. There is a foodstuffs committee, a coal export committee, a charter licensing committee, and without permission from one or other of the various bodies a British ship owner cannot send his vessels to any part of the world. Official brokers are engaged to take a part in the freight markets, and, thanks to England's control of coal-ing stations, and partly to her position in the insurance world, some supervision

is exercised over neutral steamers, which have not the same independence that they enjoy in times of peace. While it would be an exaggeration to say that the position of shipping is satisfactory, the government may fairly claim that it has helped to check the rise in freights and to employ tonnage more economically than it was employed last year.

Service is Resumed

The reentry of the Pacific Mail Steamship Co. into the transpacific trade, after a lapse of almost a year, began on Aug. 19 when the steamer *ECUADOR* sailed from San Francisco for the orient. As outlined in *The Marine Review* last month, the service was discontinued and the principal ships sold, as a consequence of the enactment of the seamen's law, control of the company later passing to the American International Corporation and W. R. Grace & Co., New York, so that the line is reestablished under new management. That the resumption of service is in the nature of an experiment was indicated by a statement of George J. Baldwin, president of the company.

"High freight rates make the cost of operation negligible during the war," said Mr. Baldwin. "Nothing we can do will insure the continuation of the service when freight rates return to normal levels. It depends upon what Washington does whether the vessels can be kept on the transpacific run."

Three vessels: *VENEZUELA*, *COLOMBIA* and *ECUADOR*, purchased from Dutch interests about four months ago, will be used in the service. *VENEZUELA* and *ECUADOR* have arrived in American waters and have been converted into oil burners so that space may be economized. *COLOMBIA* is still in Holland, having struck a mine on her voyage here, which forced her to return for repairs. She is being fitted to use oil in Holland.

When the Pacific Mail steamers were withdrawn last fall, numerous protests were received from the far east. The attitude of the orientals toward the reestablishment of the service is shown in the following telegram received by President Baldwin from the Chinese minister and the Japanese charge d'affaires at Washington.

"It gratifies me to learn from your telegram of this date that the Pacific Mail Steamship Co. will reinstate a service of steamships between Chinese and American ports on Aug. 19, when the passenger steamer *ECUADOR* will sail from San Francisco for China, to be followed by *VENEZUELA* and *COLOMBIA*. I heartily congratulate your company on taking this step. It is one which I believe will greatly facilitate trade and intercourse between the two great re-

publics, and thereby materially help promote the friendship and confidence which the people of China and the people of the United States have always cherished towards each other.

"V. K. WELLINGTON KOO."

"Your telegram announcing resumption of Pacific service is very welcome news to every good wisher of America in her relations to far east, and I heartily congratulate you on this timely decision. I venture to hope that you will soon see a way to enlarge the service commensurately with glorious history of your company and ever increasing traffic on Pacific.

"TANAKA."

President Baldwin made the following statement on the resumption of service by the Pacific Mail:

"It became impossible for American capital to operate ships on the Pacific ocean under the American flag in normal times, partly due to the cost of construction of American vessels, but principally because of the increased operating costs over those of other nations.

"If the seamen's bill is left un-

modified and the Alexander shipping bill should become a law without material modification, then this condition of affairs will again prevail in normal times.

"No one can clearly foresee the future of the shipping business after the war, but we are such firm believers in the necessity of an American mercantile marine that we desire to do everything in our power to assist in its creation. We believe the time must soon come when our lawmakers will realize the necessity for considering facts instead of theories in regard to American shipping and will stand ready to encourage American capital to go into it.

"In common with everyone else, we saw this need when the Pacific Mail Steamship Co. was sold by its former owners. We know that during the existence of the present abnormal freight rates these ships could be profitably operated and, having bought them, we propose to continue their operation as long as this may prove profitable, believing that such revision of our laws will be made as will enable us to continue permanently the only transpacific line operating under the American flag."

Our Ships Seek Brazil

PRIOR to a service inaugurated by the United States Steel Products Co. in 1913, the growing trade between the United States and Brazil was entirely, for a period of 20 years, in the hands of a system of foreign ship owners working in a triangular route between Brazil, Europe and the United States, and controlling the American trade with Brazil by a system of primages and rebates, says *Commerce Reports*.

There is now, however, a regular, well-organized, and a properly conducted steamship service between the United States and Brazil, which is managed by the United States & Brazil Steamship Co., a branch of the United States Steel Products Co. It was naturally instituted to carry, primarily, the steel cargoes of this particular company to Brazil, and perhaps to fill its holds in part with manganese ore on the return voyages. But steel is what shipping agents know as "dense stowing"—its great weight in relatively small bulk leaves much space for other cargo; and manganese ore is never procurable in such large quantity as to deny cargo space to much miscellaneous Brazilian merchandise.

Besides this line, there are the weekly British Lamport & Holt line, the Brazilian weekly Lloyd Brasileiro line, and occasional British Prince line steamers, plying between American ports and Brazil. The Lloyd Brasileiro is a

Brazilian cargo and passenger line, whose usefulness is in a measure offset by the fact that it is primarily only an annex to a Brazilian system of coast and interior river services and that it loses much time in transit between the United States and Brazil by frequent stops at small Brazilian coast ports.

Decrease in Foreign Shipping

There has been a general decrease in the foreign shipping in Brazilian ports due to the war. In 1913 the total tonnages were 29,170,259; in 1914, 23,846,058; and in 1915, 19,494,771. England, France and Italy have recalled much of their shipping, and the decrease in the bottoms of these countries in 1915 over the last normal year, 1913, is 48, 22 and 9 per cent, respectively. The shipping of the Netherlands, on the other hand, increased by nearly 200 per cent. That of the United States increased by 274 per cent in 1914 over that of 1913 and by 143 per cent in 1915 over 1914, thus representing an increase of 803 per cent in 1915 over 1913. Similar progress is shown since the war began, although on a smaller scale, by Denmark, Norway, and Sweden. Paraguay's shipping has more than doubled, although this is little more than a coastwise trade, while Uruguay's shipping has declined considerably. Argentina shows some increase. Spain's increase is notable. A small increase

is also noted for Russia. German and Austrian shipping, the former second only to Great Britain and growing rapidly before the war, have disappeared from the statistics for 1915.

The accompanying table shows the entries of steam vessels at Brazilian ports for 1913, 1914 and 1915, classified by nationalities of vessels.

In addition to the statistics given, there were 4,956 sailing vessels of 415,879 tons that entered Brazilian ports during 1915, compared with 5,170 vessels of 385,609 tons for 1914, and 6,295 vessels of 606,256 tons for 1913. Of the total for 1915, 4,639 sailing vessels were Brazilian, 99 American, 89 British, 49 Norwegian and 40 Argentine.

The year 1915 showed a very visible increase over the preceding one in the number of American vessels entering and leaving the port of Rio de Janeiro. From Jan. 1 to June 30, 42 American vessels entered the harbor, against nine

Every Vessel is Searched

A Description of England's Method of Carrying on the Blockade Against Germany

THE most detailed description of the British system of blockade which has been given, was presented to the members of the American Luncheon Club at London by Sir Frank Newnes, in a recent address. Sir Frank is acting as assistant secretary of the committee on detention of neutral ships, presided over by Lord Peel. His explanation of the system follows:

"Every ship east or west bound passing up or down the English channel or by the north of Scotland, is stopped by one of the British men-of-war, boarded and examined. These

and I may say that the contraband committee works so expeditiously that its decisions on the ship or goods is nearly always given the same day that the manifest is put before it.

"When the manifest is telegraphed to the contraband committee it is also telegraphed to the war trade intelligence department, which has been created for the purpose of supplying information on which the contraband committee can decide whether certain goods should be allowed to go forward or not.

"In addition to the contraband committee there is the enemy exports committee, which deals with goods exported from Germany. This is a much simpler task than dealing with imports into Germany, as America and other countries, for the purpose of their customs, already require that the country of origin shall be given and the effect has been that the export trade of Germany was almost immediately killed.

"When suspect goods are unloaded from a ship they are at once put into 'prize', and the owner of the goods has to make a claim for their restitution and must bring an action for their recovery. Such actions are tried in the admiralty court, and the goods are released, condemned or dealt with as the court may deem just."

America Handles More Brazilian Trade

Nationality.	—1913—		—1914—		—1915—	
	No.	Tonnage.	No.	Tonnage.	No.	Tonnage.
Brazilian	13,162	10,092,773	13,094	8,717,146	13,865	8,817,519
British	2,951	9,802,442	2,111	7,657,416	1,492	5,027,326
German	1,321	4,253,729	839	2,823,900	.....	.....
French	409	1,296,312	336	1,180,415	303	1,023,742
Italian	340	1,089,199	244	846,630	300	988,939
Austrian	191	556,958	105	306,181	.....	.....
Dutch	140	550,148	197	818,822	343	1,602,208
Argentine	568	225,163	494	201,254	602	252,796
Norwegian	41	50,715	84	136,083	149	277,933
Spanish	38	130,065	83	263,798	79	260,066
Swedish	70	157,851	74	166,373	114	244,577
Uruguayan	75	66,059	49	49,240	48	32,377
Belgian	68	125,654	46	97,380	3	7,242
Danish	29	52,498	13	22,046	68	121,556
Russian	1	1,616	.....	.....	3	10,591
American	10	37,057	39	137,981	95	334,812
Greek	10	24,240	4	9,035	16	34,060
Paraguayan	49	14,112	88	19,566	150	33,240
Japanese	5	17,870	2	7,124	.....	.....
All other	9	19,532	1	59	13	9,908
Total	21,487	28,563,993	17,903	23,460,449	17,643	19,078,892

for the corresponding period in 1914. They were classified as follows: Steamships, 14; barks, one; sailing ships, one; schooners, 26.

The latter half of 1915 again showed a substantial increase in number of vessels over the first half of the year and nearly four times as many in contrast with the corresponding last six months of the previous year. During these six months a total of 61 American vessels, against 17 in the last six months of 1914, entered Rio de Janeiro, 47 being steamships and 14 schooners. Therefore, a total of 103 American vessels came into that port in 1915, contrasted with 26 for the preceding year.

Only three ships flying the American flag anchored in Rio de Janeiro in 1911; 103 anchored there last year.

Capt. A. W. McKinnon of the British steamship PRINCE GEORGE, is at his home in Yarmouth, N. S., as the result of injuries sustained by a fall into a dry dock.

ships are armed merchantmen and are on duty right across from the north of Scotland to Norway, one ship every 20 miles—they are manned by the royal naval reserve men from the mercantile marine who are used to examining ships' papers and documents. A copy of the ships' manifest is then wired up to London—and to give you some idea of the labor involved some ships have between 300 and 600 different descriptions of goods on board, all of which have to be sent out—and thus these telegrams run to many thousands of words. The telegraphed manifest goes at once before the contraband committee, which sits every day and all day. The committee considers each item, and if it has any reasonable suspicion that any items are destined for the enemy, the ship will be detained and ordered to unload the suspected items at a suitable port. If she has nothing suspicious the ship can proceed at once;

New Hudson Barge Line

A new plan of rail and water shipments of iron ore from the Port Henry district in New York to blast furnaces in eastern Pennsylvania has been worked out by Witherbee, Sherman & Co., Inc., leading operators in that district, under an arrangement with the New York & Western Canal Line, Inc., 59 Pearl street, New York. The ore is being carried by barge down the Hudson river from Albany to New York harbor and transhipped at Elizabethport, N. J., by rail. Two fleets of boats now are operating between Albany and Elizabethport and will continue this traffic as long as river navigation is open. Each fleet consists of a steam power barge and of four consorts each 98 feet long, 17 feet 6 inches beam and 11 feet in depth, with a capacity of 375 tons each. About 1,600 tons is regarded as a full fleet load. This movement by water has been going on for several weeks, and several fleet loads have been delivered. The ore is brought to Albany from Port Henry by rail and is loaded into the boats from coal trestles at the Church

street wharf in Albany. At Elizabethport the ore is delivered to the Central Railroad of New Jersey and shipped to furnaces in the Lehigh Valley and to other eastern Pennsylvania points. Each fleet will make three trips monthly. The main object of the present shipments by water is to test out the possibilities which will be afforded when the enlarged Champlain canal from Port Henry to Albany is open to its full depth. At that time it is expected that large-sized boats can be operated from the new loading dock at Port Henry now under construction to Elizabethport at a much lower rate of freight than now obtains by the all-rail route. At present, the Champlain canal is open only to a 6-foot depth, and it is expected that it will be some time in 1917 before that waterway will permit of full navigation.

Subsidy Approved

Recognizing the need of better shipping facilities, particularly for Columbia river traffic, and determined to take some action looking to improvement, about 40 of the representative business men of Portland, Ore., recently met with the directorate of the chamber of commerce and adopted plans which, it is believed, will solve the question. There are being built in Portland and its vicinity by private capital about \$5,000,000 worth of ships, but these are not all destined to operate from that port or from Columbia river points. With the view of financing a ship building company for the construction of ships to operate between Portland and Alaska, Puget Sound, San Francisco, and other ports on the Pacific coast, the following project was inaugurated. The plan is to raise a tax of 1 mill a year for five years, the fund to be disposed of by the commissioner of docks, port of Portland, or a special shipping commission authorized by legislative act, in the form of a subsidy or bonus for steamship lines that will give the service needed.

It was claimed that the war in Europe was responsible for loss of shipping at Portland, and that the trend in the northwest set against them in earlier days, on account of inadequate channels. Now that they have suitable channels, it was declared to be imperative that they use extraordinary means to regain lost shipping and that Portland take a fair share of future increases.

The federal government has expended more than \$15,000,000 at the mouth of the Columbia river to make the great channel through which to enter the Columbia river basin. Other millions are being spent by the government to finish the river channels between Portland and the entrance, and the city hopes to utilize them fully.

New Ships Carry Lumber

TWO new ships of the American-Hawaiian line, designed especially for the lumber trade, have recently made their maiden voyages through the Panama canal. Both are engaged at present in carrying nitrates from Chilean ports to the United States; their diversion to this trade, however, is regarded as temporary and on account of the high freights prevailing on nitrates because of the demand for them in the manufacture of explosives.

The first to pass through the canal was *ARTISAN*, making her maiden voyage to Arica with coal. *ARBOREAN*, a sister ship, arrived at Balboa from Taltal a few days later, carrying 9,000 tons of nitrates to Norfolk. This was her first homeward voyage; outward, she left Baltimore in April with coal for Buenos Aires, after the delivery of which she proceeded to Taltal by way of the straits of Magellan.

The ships are similar in construction to the type known as the "west coast lumber schooner," but their size is unusual for this type, says the *Canal Record*. Each is 389 feet 6 inches in length by 54 feet 6 inches beam, with a depth of 32 feet 6 inches, and is registered at 5,550 tons gross. The essential feature in construction for the lumber trade was the placing of the engines and most of the housing well aft, leaving a long, broad deck clear, except for the masts, for the loading of lumber. The bridge, with the captain's quarters, is of skeleton construction and lumber can be loaded beneath it practically as well as on the open deck, all the way forward to the forecastle. The ship can carry approximately 2,500,000 feet of lumber on deck, and about an equal quantity in the hold. She has a dead weight capacity of approximately 9,500 tons. Her hatches will allow 80-foot timbers to be loaded in the hold.

Under the rules in force at present for the collection of tolls at the canal, these ships will be charged not more than the equivalent of \$1.25 per net registered ton. As their net registered tonnage is 3,663 and their net tonnage according to the rules for measurement for the Panama canal (originally determining the charge at \$1.20 per ton) is 4,329, they will go through for considerably less than the charges under the original plan. The charge on Panama canal basis, without a deck load, would be \$5,194.80 for the vessel if not in ballast. On the basis of United States net tonnage it will be \$4,578.75. In addition, all the deck load will go through free.

The original rules for the measure-

ment of vessels for the levying of tolls provided that tolls should be levied upon a net tonnage which should represent the actual earning capacity of the ship, in units of tons of 100 cubic feet. Space occupied by deck load, being a part of the cargo-carrying capacity of the ship at the time of transit, was to be charged for at the same rate as the interior cargo space, namely, \$1.20 per ton of 100 cubic feet, or 2.83 cubic meters.

To avoid the endless complications which would have arisen if the canal had attempted to take cognizance of the nature of cargo in levying tolls, the basis of actual cargo-carrying capacity was adopted. This is the fundamental principle at Suez and is the usual canal principle where commercial expediency has not dictated departure from the practice, and discrimination with respect to cargoes, in competition with land transportation.

Section 8 of the Panama canal act, however, provided that the amount of the tolls levied on a ship should not be in excess of the equivalent of \$1.25 per net registered ton. Shippers carrying deck loads brought this to the attention of the government, claiming that the aggregate of charges on interior space and deck load should not be greater than the equivalent of \$1.25 times the registered net tonnage of the ship as found by applying the United States rules of measurement. The attorney general decided that the factor of the United States registered tonnage should be considered; and that while tolls would continue to be levied on net canal tonnage, at \$1.20 per net ton for loaded vessels, and also \$1.20 per 100 cubic feet of deck load, the amount collectible should not exceed \$1.25 per net ton, United States registry measurement.

Following this ruling, deck loads are charged for sometimes, and sometimes not, dependent on whether the sum of the canal tonnage plus deck load tonnage, multiplied by \$1.20, is less or greater than the vessel's net registered tonnage multiplied by \$1.25.

A. S. Mihara, chief representative in this country of the Japan Mail Steamship Co., Ltd., recently inspected the port facilities of Philadelphia and expressed himself in favor of making the city one of the company's ports of trade. Assistant Director Hasskarl, of the municipal department of wharves, docks and ferries, assured the representative that he would immediately solicit various local trade organizations and exporters in order to obtain a guarantee for return cargoes.

England Makes After-the-War Plans

By Careful Coordination of Plans and Effective Cooperation Between
Ship Owners England Hopes to Maintain Her Maritime Supremacy

IF BRITISH shipping is not as supreme after the war as it was before the war, that will not be the fault of any of the individual firms concerned, according to the *Glasgow Herald*. All the companies—cargo as well as passenger—have been doing their utmost to maintain their ordinary services and at the same time meet the heavy demands of the naval and military authorities. It is also evident that they are endeavoring to anticipate the requirements of the after-the-war trade and to be ready to meet successfully the competition of what are at present enemy countries. They cannot do this unless they can build up strong reserves in the times when money is to be made, so that they may be able to spend more freely and to cut rates on freight if necessary when the testing time comes. This is a point on which the many critics of the ship owners are curiously silent. These assume that the profits which are being announced all represent clear gain and have no relation either to the past or to the future. They have really a close relation to both. In many cases they help to make good the losses of previous years or to pay belated interest on capital sunk in enterprises useful to the country but hitherto unprofitable to their promoters. In others they mean that the firms concerned will be more capable of taking their part in the great commercial struggle to which they are looking forward, and in which, if they fail, they will drag down with them the prestige of British shipping and the power of the nation to maintain itself as the leading maritime country of the world.

We are not pleading for inordinate profits for ship owners any more than for any other class in the community, but it is necessary that we should see questions of this kind in their true perspective and from the point of view of our national interests after the war. It is necessary to "control" freights in certain services, because this is demanded by the exigencies of the war, and it may be found equally necessary to take steps to reduce the high cost of carrying the necessities of life. But it must always be remembered that shipping does not exist for the period of the war only, and that the "rainy day" for which

it has to prepare will come when the naval and military authorities of Europe have made up their sanguinary quarrels, and when the warfare is transferred to the commercial activities of the respective nations.

In addition to financial soundness there must be a well defined national policy, and also the ability on the part of the great ship owning firms to control trade over the largest possible areas, and in every possible part of the world. The national policy is a matter for the executive government, and it is one to which their attention cannot be given at too early a stage. But the ability to control worldwide trade depends very largely on the enterprise of individual firms, and on their capacity for acting with a common purpose in

ceedingly, sending their ships into every corner of the globe where trade was to be picked up, and trusting to the aggregate profits to cover whatever losses might be sustained on "side line" enterprises. If, after the war, British shipping as a whole follows the same general policy, it will be quite justified by present circumstances, and, in all probability, by results. We heard much in pre-war days of an All-Red route across the North Atlantic and Canada, and down the Pacific to Australia and New Zealand. Evidently the Cunard Co. has in view a still greater imperial service, as its absorption of the Commonwealth and Dominion Line, its recent working arrangement with the Canadian Northern Railway Co., and its earlier joining up with the Anchor and Brocklebank North Atlantic and Indian services—all acting in unison—will permit them to inaugurate an All-British, round-the-world route of an unprecedentedly comprehensive character. By such enterprise as these methods show, and by the cooperation of all British shipping for the promotion of imperial interests, it should be possible not only to retain the trade of the empire in British hands, but also to

A Viking's End

THE MAN who crossed the Atlantic ocean alone in a little fishing dory lost his life last winter, through some ironical whim of fate, on the ice a few yards from his ship at Lorain. His name was Ludwig Eisenbraun, and his exploit filled the front pages of newspapers more than twenty years ago. Since then the plucky sailor disappeared from public view, in his vocation as a barge engineer. During the past eight or ten years he had been in the employ of the Pittsburgh Steamship Co., and was engaged as a watchman on the ship BLACK PRINCE when found frozen on the ice-covered harbor not far from his charge.

the national interests. They can do this best by joining forces, either as amalgamations of capital or as federations of firms, working in harmony instead of in competition. The amalgamation of the Cunard Steamship Co. and the Commonwealth and Dominion Line is an apt illustration of the first of these methods. For several years past the Cunard company has been lengthening its cords and strengthening its stakes—extending its influence first in one direction and then in another. The same may be said of the Canadian Pacific Railway Co., and to a less extent of other British lines which have, by amalgamations or working agreements, helped to make isolated firms into powerful groups, and so to consolidate British interests.

The time is past when each firm of ship owners had its own particular route, to which it confined itself, and outside of which it rarely ventured. The Hamburg-Amerika line and the Norddeutscher Lloyd have long acted on the assumption that all the world was their field. They have multiplied services ex-

compete very strongly throughout the rest of the world with what will remain for many years "enemy" shipping. But the enterprise of individual firms, or that of many firms acting in harmony, cannot prove successful unless it is powerfully supported by the home government and the governments of the dominions. The royal navy and the mercantile marine have been working hand in hand all through the war. They are absolutely inseparable, and the existence of each has depended wholly upon the other. The fleets are really one, not two. This fact was not realized previous to the war as it is now, and as, we may be sure, it will be realized in future.

In the same way we must realize that the continued existence of the British Empire depends upon the prosperity of its mercantile marine—that each depends wholly upon the other. There may be a middle way for a continental power, which may be able to make itself self-contained and independent of the rest of the world. There is no middle way for us. We must be either a powerful maritime empire or no empire at all.

and upon the supremacy of our merchant shipping there depends the very existence of that federation of free British nations which so many of us have idealized within recent years, and which seems now within reasonable distance of full realization. So it will be the imperative duty of the empire as such to rally to the support of shipping, to see that whatever international disadvantages it labors under are removed, that it is encouraged to organize itself for world services, and that it is acknowledged for what it is—the greatest of our world-wide industries, and an industry without which the British Empire, as an empire, would at once cease to exist, and the integral parts would cease to have any freedom worthy of the name.

New Pier Fenders

By A. A. Willoughby

The use of suspended fenders on concrete piers Nos. 30 and 32 at San Francisco has proven successful in reducing maintenance costs. The presence of the deadly teredo and limnoria in the waters of San Francisco bay, limits the life of a green pile to about a year and the treated section of creosoted fender piles also wears through owing to rough usage, making maintenance a considerable item. Few disadvantages have developed during the time the suspended fenders have been in use and these are not serious. Nearly two miles of suspended fenders are now in use at San Francisco.

Three factors regularly enter into the design of a fender line — initial cost, maintenance cost and ease of making repairs. The design of a fender line for a concrete pier necessitates the use of a cushioning device of some sort to protect both the pier and vessels. In a wooden pier, flexibility is naturally present.

How Fenders are Suspended

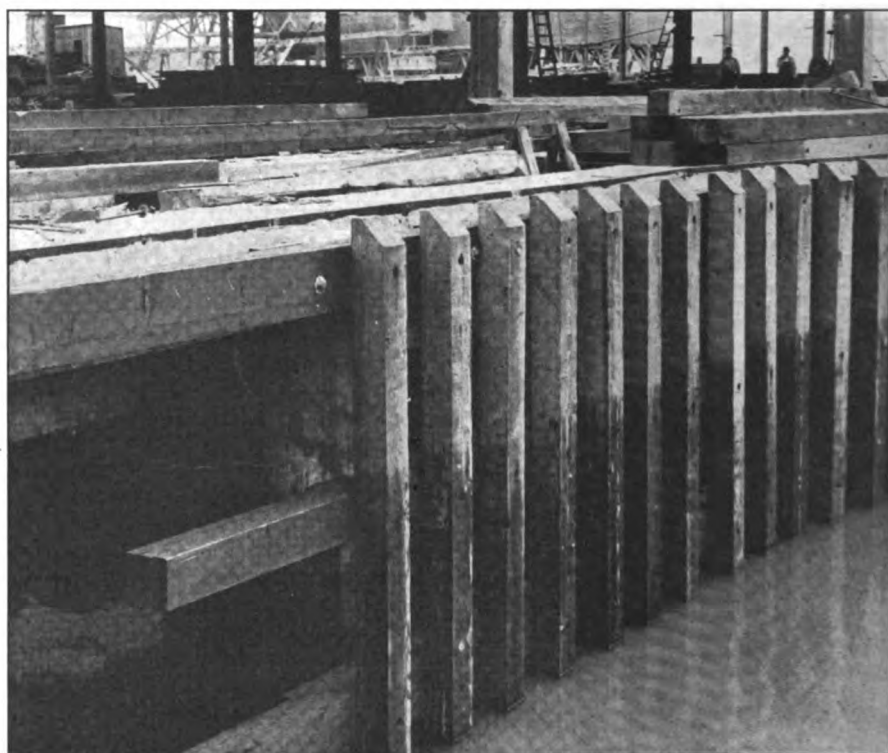
The piers on which the suspended fenders were installed are of the reinforced concrete cylinder type of construction. The supports for the suspended fender structure, consists of reinforced concrete cantilevers projecting out from the cylinders on the lines of the main transverse girders. As shown clearly in the accompanying illustration three lines of ribbing were built up of creosoted lumber, carrying the vertical sheathing which is of green timbers. The ribbing is secured to the pier proper by 1-inch chain. Between the ribbing and the cantilever on the upper and lower rows, a 12-inch, 3-coil standard spiral car spring is interposed at each point of con-

nection, using a cast steel cup bolted to the concrete to provide for the thrust and to keep the spring in place. The spring has a compressibility of 3 inches and supports a pressure of 25 tons. Through the use of chafing plates, both the concrete and the ribbing are protected.

The sheathing consists of 10 x 10-inch timbers of Douglass fir, 16 feet long. They are spaced on 2.5-foot centers, using chocks on each row of ribbing. The best size of sheathing has been found by tests to be 10 x 12-inch, separated by 10 x 12-inch chocks and this will be used in future fender construction. The rows of ribbing consist either of three 4 x 16-inch, three 4 x 12-inch or three 6 x 12-inch, according to convenience in fitting the

ing in ultimate cost and less interference with shipping in making repairs. In the first instance, the determining factor which caused the adoption of this type, was the fact that the thin stratum of mud overlying the hard bottom of these piers, was unsuitable to driving wooden piles for any purpose.

The plans for this type of fender were prepared under the direction of A. V. Saph, formerly chief engineer for the state harbor commission. The installation was made under the supervision of Jerome Newman, present chief engineer. For the information contained in this article, acknowledgment is given to Charles N. Young, chief draftsman, state harbor commission.



HOW SUSPENDED FENDERS ARE SUPPORTED

design. The outer corners are the only points where trouble has developed. Incoming and outgoing boats when not skillfully managed, have torn several of the fenders loose through warping or striking. At the corners it was necessary to bolt the sheathing direct to the horizontal beams. The best practice at pier corners where springs cannot be used is to employ a large floating rope fender. The difficulties at the corners however, have been overcome in a large measure by leaving a recess in the concrete structure, in which a large cluster of wooden piles is placed.

The advantage of a suspended fender as shown by experience at San Francisco includes a considerable sav-

Big Shipment of Cars

A consignment of steel cars, the first part of a contract running well into millions of dollars, left Philadelphia for France on the steamer CAMLAKE a few weeks ago. The cars are being sent through Philadelphia by the National Steel Car Co., Hamilton, Ont., and Furness, Withy & Co., Ltd., Philadelphia. It was the largest shipment ever made from the port and with a single exception, from the United States. The shipments will be made from Municipal Pier No. 16, recently leased for the purpose by the steamship company. Three steamships have been chartered to run between six and nine months to handle the full contract.

American Ship Yard Activities

A Snappy Summary of the Leading Events of the Month in the
Vessel Construction Field

Baltimore Yard Has Surprising Growth

WHEN word was flashed to this country that DEUTSCHLAND had completed her return trip and was anchored in the Weser river behind the sheltering curtain of the German fleet, the city of Baltimore took keener pleasure in the news than any other city in the country. That the choice of their city as the half way stop by the first transatlantic submarine stirred the civic pride of Baltimore's people, was betrayed by the elaborate receptions held for the officers and crew during their stay in port and by the speculative fears which her return voyage aroused.

Built First Submarine

The decision to send DEUTSCHLAND to Baltimore was peculiarly appropriate, even aside from considerations of deep channels and suitable anchorage. For at Baltimore the first models of both the Holland and Lake types of submarines were built. The plant at which these original submersibles were constructed is now part of the extensive works of the Baltimore Dry Docks & Ship Building Co.

This company, after an existence of a century, is now building more and larger boats than at any other time in its history. Its reports to the bureau of navigation, department of commerce, show that on Aug. 1 work was under way on seven vessels of a gross tonnage of 24,500. Even this building program is only part of the company's activities, as it has specialized for years on repair work.

The company is now operating three plants: upper, at the foot of East Cross street; lower, at East Fort avenue near Fort McHenry, and the ship ceiling department, 1720 James street. At the upper plant is a 600-foot dry dock, the width of the dock floor being 62 feet and the draft over the sill at low water being 22½ feet. This dock can accommodate the largest vessel that has ever entered Baltimore harbor. This yard

also is equipped with a large marine railway of 1,500 tons capacity, one of 800 tons capacity and complete construction and repair shop equipment. At the lower plant is another dry dock, the length on the keel blocks being 437 feet, the width of the dock floor 50 feet, and the draft over the sill at low water, 22½ feet. This dock was recently overhauled. This works also includes machine, boiler, pipe, coppersmith, blacksmith, paint and joiner shops, and a completely equipped foundry.

Of the more than 2,000 men employed, about 1,500 are at work at the lower plant. Its location permits

tury ago when it built a number of the speedy vessels that made the American "clipper fleet" renowned the world over. In addition, a large number of passenger and freight boats for Chesapeake Bay service were built. The first oil tanker MADRICK, was built at this yard, which has also turned out cruisers, destroyers, gunboats, submarines and revenue cutters for the United States navy.

In 1899, Harry G. Skinner, grandson of the founder, reorganized the company, then known as William Skinner & Sons, and it was incorporated as the William Skinner & Sons Ship Building & Dry Dock Co. In 1901 this company built the larger dry dock, thus giving Baltimore its first dock capable of handling large vessels.

Bought Old Yard

In 1906 the company purchased the Baltimore Ship Building & Dry Dock Co., which concern was equipped for handling steel construction and repair work. The two concerns were consolidated as the Skinner Ship Building & Dry Dock Co. The newly purchased plant had been built in 1880 and was formerly operated under the name of the Columbian Iron Works & Dry Dock Co.

In 1914, the concern was reorganized under its present name of the Baltimore Dry Docks & Ship Building Co. Holden A. Evans, then vice president of the Seattle Construction & Dry Dock Co., Seattle, Wash., was placed in active charge. Clement C. Smith is vice president, J. M. Willis, second vice president, George Allison treasurer, and Edwin W. Poe, secretary.

Under its new management extensive repairs and improvements have been made and large sums expended in the purchase of new equipment. The present scheme of improvements calls for the replacement of all older wooden buildings with steel structures. Additional property adjoining the lower plant may also be purchased to permit expansion.

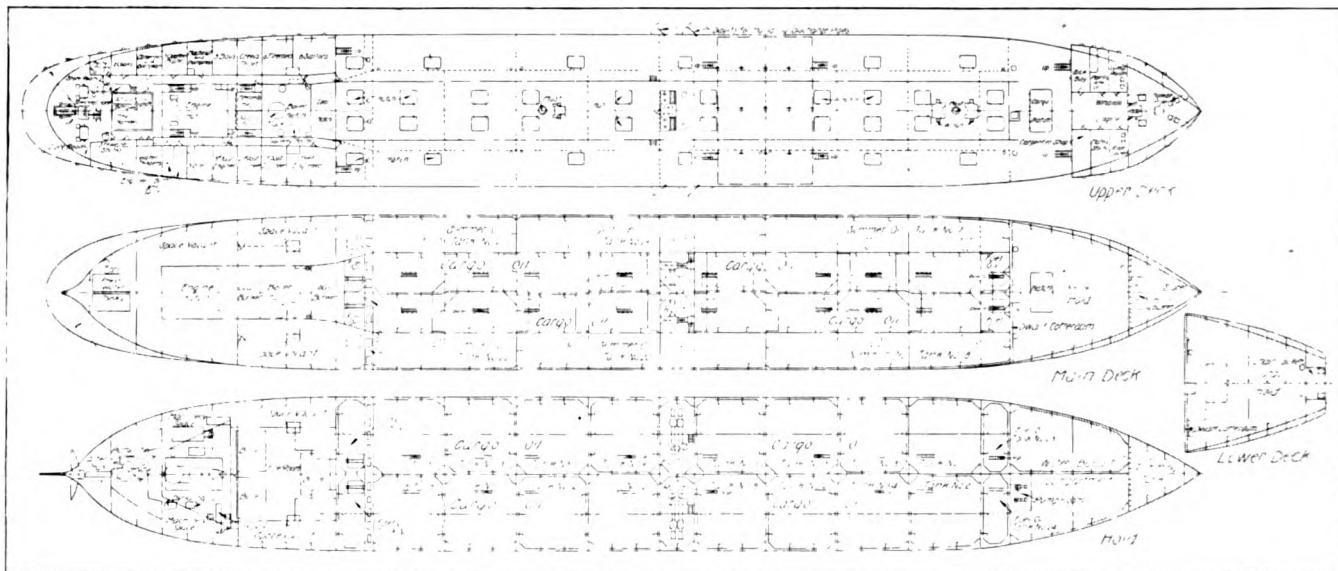
Building Seven Boats

Recent orders received by the Baltimore Dry Docks & Ship Building Co., Baltimore, increase to seven the number of oil tankers which this concern will build. One boat is nearing completion, and four more will be launched this year. The vessels are of 3,500 tons gross, with a speed of 11½ knots. One is building for the Vacuum Oil Co., three for the Transatlantic Motor Ship Co., and three for Christoffer Hannover. The boats were fully described in The Marine Review, December, 1915.

either construction or repair work to be handled advantageously. The plant is situated close to the entrance to Baltimore harbor, near the grain elevators and the loading and unloading piers. The Baltimore & Ohio railroad runs alongside the yard affording excellent switching accommodations. The ship ceiling department employs about 100 men and is completely fitted for handling this work.

History of Company

The company was originally formed by William Skinner. Under charge of Mr. Skinner and his sons and grandsons, a large ship building and repair business was built up. The plant achieved prominence a half cen-



Deck Plans of Oil Tanker J. M. DANZIGER

New Oil Tanker is Well Equipped

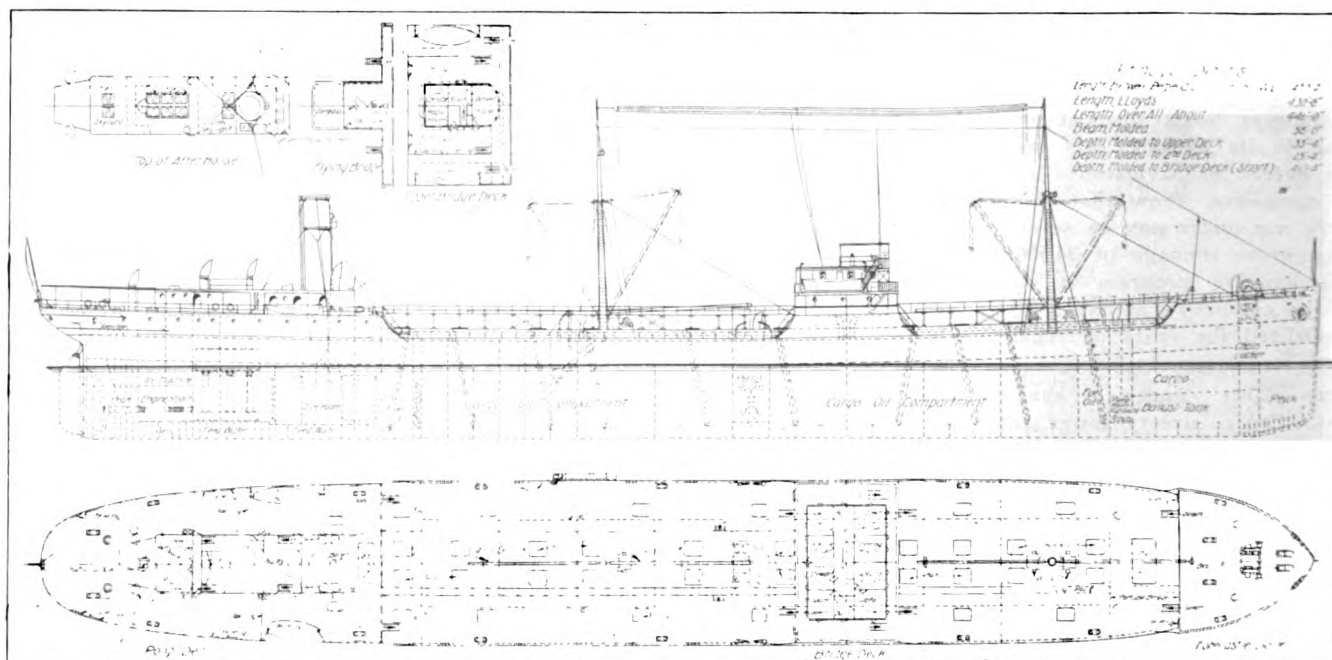
SEVERAL unique features of J. M. DANZIGER, a bulk oil steamer built for the Pan-American Oil & Transport Co. and recently launched at the yard of the William Cramp & Sons Ship & Engine Building Co., Philadelphia, have aroused interest in maritime circles. The vessel is built on the Isherwood system following Lloyd's highest classification. She has two complete steel decks from stem to stern with raised forecastle, bridge and poop deck. The hull of the ship is entirely of steel, in fact, the only wood used, being in the interior of the living quarters and pilot house, being used chiefly for its esthetic

qualities. A steel deck will be erected on the bridge deck for the accommodation of the captain and deck officers. Officers and petty officers will be accommodated in another steel house which will be built on the poop deck. Quarters will be provided aft for the chief engineer, his assistants, and firemen and crew.

Living Quarters Sumptuous

The living quarters will be well furnished, the comfort of the men being assured by complete electric lighting, heating and sanitary plumbing installations. The galley equipment includes,

in addition to the regular furnishings, a cold storage plant with a 2-ton ice plant. The propelling machinery for the single screw will consist of a vertical, invert, triple-expansion engine. The cylinder dimensions are 27 x 45½ x 76 inches in diameter with a 51-inch stroke. Three single-end Scotch boilers fitted with forced draft will furnish steam for the engine. The boilers are so arranged that either oil or coal may be used as fuel. Two large pumps will handle the bulk oil cargo through a complete system of piping and valves which will permit the oil to be stowed or unloaded from any portion of the ship. The two



GENERAL ARRANGEMENT OF J. M. DANZIGER

accompanying illustrations show the deck plans and outboard profile of J. M. DANZIGER.

The principal dimensions of the vessel are as follows:

Length, over all, feet.....	446
Length, Lloyd's, feet.....	430
Beam molded, feet.....	58
Depth of main deck, molded, feet..	25.3
Speed, knots	11
Carrying capacity, tons.....	10,000

DANZIGER has already sailed for Tampico. She is a 10,000-ton ship and will carry about 70,000 barrels of oil. The speed requirement of the contract was 11 knots, but on her trial trip an average of 12 knots was reached. She will be used to carry oil for the Mexican Petroleum Co., control of which is now held by the Pan-American Oil & Transport Co. DANZIGER is the second ship built in this country for the Pan-American Oil & Transport Co., the first being GEORGE E. PADDLEFORD, which left for Tampico during the latter part of June and which already has made two trips. The Pan-American company also has a number of other ships under construction. The William Cramp & Sons Ship & Engine Building Co. is building two more, the Fore River Ship Building Corporation (a subsidiary of the Bethlehem Steel Co.) and the New York Ship Building Co. are each building two. The latter will be the largest, having a capacity of 90,000 barrels. In addition to these the Pan-American Oil & Transport Co. has four ships building on the Pacific coast. These vessels will be among the finest vessels in the oil carrying trade.

To Build Wooden Ships

The Peninsula Ship Building Co. Portland, Ore., announces it has established its plant for the construction of wooden ships on the Willamette river in close proximity to one of Portland's largest saw mills. The company plans to build standard vessels and also to construct specially designed boats to order. F. C. Knapp, president of the Peninsula Lumber Co., is president of the Peninsula Ship Building Co. In addition to Mr. Knapp the directors of the company include A. L. Mills, president First National Bank, Portland; W. M. Ladd, president Ladd & Tilton Bank, Portland; J. C. Ainsworth, president United States National Bank, Portland; Peter Autzen, president Peninsula National Bank, Portland; T. B. Wilcox, president Portland Flouring Mills, Portland, and J. B. Kerr. Carey & Kerr, attorneys, Portland.

The steamer J. H. MENGE, Capt. A. J. Thomas, which was thought lost in the recent gulf storm, reached Mobile in safety.

Busy All Over the World

THE remarkable expansion of the American ship building industry, outlined in *The Marine Review* last month, is matched only by the growth of business in the yards of other neutral nations. The scarcity of tonnage and the overwhelming demand for vessels has caused ship building plants throughout the world to rush to completion new vessels as rapidly as they can be turned out. Facilities and equipment are being extended and new companies are being formed to engage in the task of adding to the available supply of ships. The British yards which formerly ranked ahead of all others in their production are closed to foreign business, while the German yards, concerning which little definite information is at hand, cannot aid in meeting current needs. The nations which in the past depended largely upon the British and the German builders must now help themselves and the result is that activity is reported in regions where ship building was practically unknown before.

The opportunity thus offered has been used to the best advantage by the United States, latest figures showing that this country is in the lead. Millions of dollars have been spent in improving and extending old plants, while as these booked contracts for two years ahead to occupy their entire capacity, new companies have entered the field to meet domestic and foreign demand. Norway has been a heavy buyer here, with Britain not far behind, and other countries have ordered in proportion. Contracts for more than 1,250,000 tons of steel merchant ships were reported by domestic builders on Aug. 1, and the total has been steadily rising for more than a year. Ship building prosperity has not been confined to any one section of the country; it has affected the small, long abandoned plants in Maine, the Great Lakes builders and the large Atlantic and Pacific coast interests alike.

Reports from Japan indicate unusual activity in ship building in that country. The Mitsubishi yard at Nagasaki employs 10,000 men, the Mitsubishi yard at Kobe employs 2,400, the ship yard of the Osaka Iron Works, 3,000, the Kawasaki yard at Kobe 2,500, the Uruga yards, 1,900, the Harada yard 300, while about 1,000 more are distributed over the smaller works. Some 2,000 men are employed at the new ship building yard erected for the Toyo Kisen Kaisha at Yokohama.

The work in hand comprises the following: For the Nippon Yusen Kaisha, four steamers at the Kawasaki Works and five at the Mitsubishi yards, making a total of 54,410 tons; for the Osaka

Shosen Kaisha, one steamer at the Osaka Iron Works and two at the Kawasaki works, total 12,400 tons; for Tatsuma & Co., two steamers at the Mitsubishi yard, Kobe, total 10,300 tons; for S. Toyosaki, two steamers at the Harima yard, 2,300 tons; for the South Manchurian Railway Co., one steamer at the Mitsubishi yard and one at the Ono Iron Works, total 10,382 tons.

Difficulty in obtaining raw materials has retarded the development of the industry in Japan to some extent. The Japanese builders have turned to the United States for steel, and the high prices paid have increased the cost per ton but not as much as in other countries. A price of 190 yen per gross ton was recently paid for a 5,200 ton cargo steamer, comparing with 130 yen and 140 yen per ton before the war. Further increases are anticipated.

Neutrals Work at Maximum Capacity

The neutral countries of Europe are all producing ships at maximum capacity. Dutch yards are reported to have orders which will keep them busy until 1921, and a similar situation exists in many of the Scandinavian yards. Ship owners in these countries are now turning to the United States for tonnage. A new ship building company has just been organized in Norway with a capital of 300,000 kroner to 400,000 kroner, and the capital of Langesund's mek Verksted has been increased from 75,000 kroner to 575,000 kroner.

Spanish ship building also has experienced a remarkable awakening. Last year a new ship building yard was laid down at Bilbao, and plans are now in hand for still another, so that there will be altogether four. In three of them English capital has the preponderating influence, but the fourth will be entirely in the hands of Spaniards with Spanish money. It is further proposed to lay down a ship building yard at San Esteban de Cravia, in the province of Asturias, and at Barcelona a yard will be laid down, but for the building of sailing ships only.

Ship building is also booming in the British colonies. In Canada agitation has been persistent to obtain financial assistance for the yards from the government and this has actually been accomplished in British Columbia. The large British ship building companies have been invited to erect plants in the dominion, special privileges being accorded them, and several are reported to have viewed the proposal favorably. Preliminary work has been started in connection with the establishment of modern ship building yards in British

Columbia, and all yards in Canada are reported active.

In Australia a movement to develop a ship building industry has attained considerable strength, it being urged that conditions have been changed during the war so that commonwealth builders will be able to compete with those of other nations. Labor costs and difficulties have been chiefly instrumental in preventing the establishment of such an industry in the past, it is contended.

From South America comes a report that negotiations are in progress at Valparaiso for the establishment of a ship building yard near Quinteros bay, capable of turning out steamers of at least 1,000 tons register.

Italy recently passed a law admitting ship building materials free of duty and is doing everything possible to aid the industry. From France reports are not so definite, and the same holds true of Russia, although it is known that the yards there are being extended. Even from China come tales of ship building activity. British owners, unable to contract for ships in home yards, have had them built at Shanghai.

Survey Vessels' Signals

Pursuant to section 7 of the act of March 28, 1908, on application of the United States coast and geodetic survey, the following special signals have been registered by the bureau of navigation:

A surveying vessel of the United States, under way or at anchor in a fairway and employed in hydrographic surveying, may carry where they can best be seen, but in any case well above the running lights prescribed by law for preventing collisions, three lights in a vertical line one over the other and not less than six feet apart. The highest and lowest of these lights shall be green, and the middle light shall be white, and they shall be of such character as to be visible all around the horizon at a distance of at least two miles. In the case of a small vessel the distance between the lights of such private code may be reduced to 3 feet if necessary.

By day such surveying vessel may carry in a vertical line, one over the other, not less than 6 feet apart, where they can best be seen, three shapes not less than 2 feet in diameter of which the highest and lowest shall be globular in shape and green in color, and the middle one diamond in shape and white.

Captains who persist in using the wrong side of Boston harbor channels will be put on the carpet by the steamboat inspectors. The practice has become so annoying as to cause complaint. Excursion steamers are said to be the most flagrant offenders.

Latest Marine Patents

Copies of any one of the following patents may be obtained by sending 15 cents in stamps to Siggers & Siggers, patent lawyers, National Union building, Washington, D. C., by mentioning *The Marine Review*:

- 1,188,426.—Means for transferring liquids to or from ships or vessels. Thomas Fairfield, London, England.
- 1,188,436.—Submarine boat. George A. Fredericks, New York.
- 1,188,465.—Life-boat. Stanislaw Mackiewicz, Denver, Colo., assignor of one-half to John A. Newark, Denver.
- 1,188,515.—Pilot-controlled torpedo. Jacob S. Walch, Walla Walla, Wash.
- 1,188,522.—Apparatus for navigation and the like. Charles D. Woodward, Providence, R. I.
- 1,188,832.—Two-stroke-cycle internal combustion engine. Oskar Richter and Hans Vogel, Kiel, Germany.
- 1,188,842.—Submarine buoyant conveyance. Adolph Schrumpl, New York.
- 1,188,888.—Means to raise sunken vessels. Charles Thomas Bowers, Perth Amboy, N. J.
- 1,188,899.—Dredge-spud brace. Albert Basil Clardy, Balboa, Canal Zone.
- 1,189,028.—Sounder adapted for submarine use. Edward C. Wood, Somerville, Mass., assignor to Submarine Signal Co., Waterville, Me.
- 1,189,227.—Boat. Lewis P. Baker, Baltimore.
- 1,189,618.—Manually-operated screw-propeller. John Peterson, Orange, N. J.
- 1,189,660.—Internal-combustion engine. Ernest S. Bullard and Victor H. Leiner, Wheeling, W. Va.
- 1,189,749.—Self-adjusting propeller. Frank W. Stodder, Somerville, Mass.
- 1,189,864.—Device for locating and raising sunken vessels. John C. Paulson, Winthrop, Mass., assignor of one-half to Robert M. McKay, Dorchester, Mass.
- 1,189,872.—Internal-combustion engine. John R. Rogers, Brooklyn, N. Y.
- 1,189,928.—Internal-combustion engine. Thomas J. Fay, Brooklyn, N. Y., assignor to the Goby Engine Co., a corporation of Ohio.
- 1,190,046.—Automatic davit. Richard Tjader, New York.
- 1,190,074.—Marine turbine. Karl Alquist, Schenectady, N. Y., assignor to General Electric Co.
- 1,190,210.—Submarine boat. Joseph Barraja-Frauenfelder, Bridgeport, Conn., assignor to the Lake Torpedo Boat Co. of Maine, Bridgeport, Conn.
- 1,190,211.—Motive power for submarine boats. Joseph Barraja-Frauenfelder, Bridgeport, Conn., assignor to the Lake Torpedo Boat Co. of Maine, Bridgeport, Conn.
- 1,190,371.—Life-boat. Frederick W. Boulton, Bottle, near Liverpool, England.
- 1,190,569.—Pontoon or knockdown rafts. James H. Maxwell, Seattle, Wash.

New London Dock

A large deep-water dock to furnish additional dockage space has been under construction in the port of London since August, 1912. This port has been badly congested for some time. The construction of dockage in London involves excavation of the space which is to be used from the land lying east of London near the mouth of the Thames. Lloyds' agent has made a report on the present condition of this work, in which he states that considerable progress has been made, notwithstanding war conditions. This undertaking includes the creation of an enclosed deep-water area accessible to the largest ships. The site consists for the most part of low-lying

land, but a total of some 3,500,000 cubic yards of material were removed to secure the desired depth of 38 feet below the impounded water level. This large amount of excavatory work is practically completed. The dock, which tapers in width from 700 feet at the eastern end to 500 feet at the western end, will have a total quayage of about 10,000 linear feet. Seven jetties run parallel with the south quay. The dock will provide for ships of all sizes. It will be possible for barges to lie between the jetties and the quay so that steamers can deliver their cargoes into craft on either side of them as well as onto the quay by crane.

The entrance lock from the Thames, which governs the utility of the dock, has a length of 800 feet and a width of 100 feet and a depth below high-water mark of 45 feet. Three pairs of steel lock gates will allow the 800-foot length to be subdivided into lengths as may be required for small vessels and barges, while it will be possible to add another 100 feet to the available length of the lock chamber by placing a caisson at the inner end.

This new dock is to be connected with the Albert and Victoria docks by means of a passage 100 feet in width, the walls of which are now under construction. A large dry dock is an essential portion of this enterprise and is to be 750 feet in length and 100 feet in width, so that it can be used for the overhauling of dreadnaughts and large liners. It will be 20 feet wider than any dry dock at present available at London.

Tunnel Type Towboat

The Dravo Contracting Co., Pittsburgh, is building at its shops on Neville Island, Pittsburgh, an all-steel double-deck tunnel style twin-screw propelled towboat for its own use. The boat will be 112 feet long, 22 feet wide, 4.10 feet deep, with a draft of 32 inches. The available horsepower will be 250. The boat will be christened PEACE and will be one of the most modern boats of her kind on the rivers.

The Dravo company recently erected the all-steel derrick boat ATLAS, 72 x 35 feet, with a 65-foot boom, for the United States government, to be used in the Potomac river for the reclamation of ground in that river. The boat was shipped by rail and assembled at Alexandria, Va.

A large vessel, apparently a three-masted schooner, was reported recently as floating bottom up off Cape San Blas, Fla. The report was brought by the tug ECHO from Havana.

Free School for Young Engineers

Lake Carriers' Association Urges Engine and Fire Room
Employees to Increase Their Earning Power at Its Expense

AN OPPORTUNITY to engineers and oilers of vessels operating on the Great Lakes to improve their earning capacity is being offered by the Lake Carriers' Association. The members of the engine room crew are urged to enroll in the winter school for engineers, maintained by the Lake Carriers' Association, and thus secure the education necessary to their advancement. The opportunity is explained in a recent personal letter sent to engineers and oilers and published in the last issue of *The Bulletin* of the Lake Carriers' Association. The letter follows:

Any man, to earn more, must make himself more valuable, must fit himself to assume more responsible duties, must know more and have confidence in himself so that he can intelligently apply that knowledge when the opportunity comes.

The Lake Carriers' Association, for this very purpose, is already making plans for the second season of its winter school for engineers (although not starting until after Jan. 1), and it is aimed to make this as valuable as possible for each man who expects to avail himself of the advantages offered. To make a success of this undertaking requires the cooperation of both the prospective students and of the instructor.

The prime object, of course, is to assist men in gathering and understanding such technical information as they are expected to possess when applying for engineers' licenses, not by just coaching them on answers to questions they are likely to be asked by the examiners, but by helping them to master the general principles of laws of nature applied to steam engineering, to such an extent as to permit them to perform their duties in the engine room and fireroom of a vessel with intelligence, that is so they will know "the why and wherefore" of essentials in the design, construction and operation of machinery to be placed in their care. Any one so prepared need not fear the examinations given by the United States inspectors, for they are very fair and all their examinations are aimed merely to give them an idea of whether an applicant for a license is or is not a safe man to have in charge of the power plant of a vessel. No man is

a safe man to stand a watch in an engine room who does things mechanically, without thinking, without understanding just why he is doing a thing in a certain way. A safe man knows what he is doing; he reasons, he observes and tries to do everything the best way.

The greatest help which can be given a man is to induce him to help himself, to find out for himself, to check up the information submitted to him. Therefore, this school is not intended to stuff a lot of disconnected facts and data into the students, but to stimulate a desire for knowledge and to help in cultivating the students' power of observation, investigation, reasoning and memory, so that they might develop into disciplined habits. One of the greatest benefits to a man, for instance, is to have acquired the "habit of study".

So it is self-evident that, without a determined effort on the part of the student to apply himself painstakingly to the subject he is to grasp and master, the work of the school and of the instructor's personal efforts are largely wasted on him.

While there will be no fees asked for the instruction and the advantages offered in this school, no student will be able to take away anything of value to him, unless he has paid the price of serious, conscientious, persistent effort on his part, without which so many give up before they attain what they aimed at in any line of endeavor. With such determination, however, some men set aside two or three hours per day for study, even after a hard day's work at manual labor, but it is so much better and easier, if one can make a business of studying for a definite period and have the aid of an instructor in school work systematically conducted, and the encouragement of others struggling along the same lines.

The Association would like to help every serious-minded man, but must follow a plan which is practical and which will benefit the greatest number of possible students, and considers it best to encourage the men to set aside two or three months in the winter so that they might devote their attention exclusively to such study. Serious thought is being given the subject of supplementing the course by conducting a correspondence department in *The Bulletin* during the

sailing season. Send in your suggestions.

Adequate rooms for the school will be rented and furnished with all necessary equipment in Cleveland, and, furthermore, a steadily increasing collection of models and blue prints will be on exhibition, for use in the lectures and for the individual study of the students.

The rooms will be open from 8 a. m. to 5 p. m. The school will be in charge of David Gaehr, who will lecture about two hours every morning and afternoon, supplemented by blackboard illustrations, models, prints, lantern slides, etc. The rest of the time is to be given to study and working out of problems, the school hours being from 9 to 12 in the forenoon and from 1 to 4 in the afternoon, except Saturday. Students are expected to be regular in attendance and punctual.

In general the subjects to be covered are:

A brief review of and drill in parts of arithmetic (fractions, decimals, proportions, square root, cube root, etc.), algebra (the principle of equations, etc.), geometry (ordinary mensuration, etc.), physics (the lever, the screw, the winch, physical properties of air and water, vacuum, etc.), chemistry (combustion, oils, fuels, feed water compounds, etc.), mechanical drawing and machine design (the principles of drawing and sketching and reading of drawings and understanding the most common standard machine parts), steam engineering (general principles in design, construction and operation of boilers, engines and auxiliaries, including electrical apparatus, as well as steering gear), general useful information (making a man broader generally).

The time is too limited to go into all details of these subjects, in fact, only an inkling can be obtained of the abstract sciences first named; but quite a little time will be spent on some topics, and, of course, all are leading to a better understanding of steam engineering, on which most of the time will be spent. That will be enough so that a good student can get a license, if he has had sufficient experience.

It is planned to invite some special lecturers, who are authorities on certain subjects, to come and address the students from time to time, and an attempt will be made to have the students see some of the experiments in the local technical schools, which will fix in their

minds how we obtain some of the data they must use in their calculations.

Visits to shops and ship yards in company with a guide are also planned.

The students will then be shown how to keep the gist of information so obtained (in lectures, through experiments, during shop visits, etc.) in neat condensed and systematic form, in "loose leaf binders," handy to carry in the pocket, handy for quick reference. The Association is planning to give the students such sheets, printed, on most subjects, to be inserted in these binders and supplemented by the students' own sketches and notes and calculations to problems.

Naturally the students in such a school will have various degrees of education and experience, and it will be very hard to help each man in the same way. It requires considerable individual work on the part of the instructor. The better preparation a man has when he comes to school, the farther along the school can boost him.

For this reason it is desired that all who expect to enroll send in an application early and give the following information:

Name in full; nationality; age; home address; what berth do you hold now and on what steamer?; what schooling have you had (how many years and how far did you get)?; what practical experience have you had and how many years and in what capacity (in shops, on boats, otherwise)?; what license do you hold, if any?; how much time could you spend in the school next winter?; is there anything about your work that is especially hard for you to understand?; is there something you would like special instruction on?

The instructor will then go over such applications and may send out suggestions to certain applicants to study up on some preliminary subjects so as not to waste too much time on rudiments when they come to the school. Application cards are being sent to the boats with this issue of *The Bulletin* and they may be obtained from the master upon request.

The commissioners will assist out-of-town students in getting good rooming places on reasonable terms.

There will be no expense for instruction and the loose leaf books, which each student is encouraged to secure, will cost only about \$1.25.

Some of the students last year thought it was worth their while to come, even in point of meeting with men in the same vocation and talking over experiences of common interest.

Sending in an application does not obligate you definitely, but, if you do so promptly (right away), that is, if you are at all serious in the matter, it will greatly aid the Association.

Romance of Carnatic Hall

THE recent death of Walter Holland, a wealthy British ship owner, recalls an interesting bit of history with which his home, Carnatic Hall, Liverpool, is associated. The name of this mansion was derived from one of the most singular incidents which ever connected Liverpool with the sea.

The story of Carnatic is that of Peter Baker, mayor of Liverpool in 1795. During the American revolution, in 1778, Liverpool merchants and ship owners fitted out many privateers and some of them contracted with Peter Baker to build a vessel for this purpose.

Possibly Baker had had some experience in carpentry, but he knew little or nothing about naval design or construction. Being, however, a self-reliant man, he set about the performance of his contract, but turned out such a sorry specimen of a ship, clumsy and ill-built, that the prospective owners refused her, throwing her back on his hands. This was a calamity for Baker, who was heavily in debt over the venture.

Baker seems to have been a tough, self-reliant sort of chap. He called his creditors together and asked them to wait a while, as he thought he could gather enough money to fit out the vessel. He proposed to take her to sea on his own account. As nobody would buy her, they agreed to the plan.

The vessel measured 400 tons, carried 28 guns, and shipped a crew of 102, mostly loafers, picked up on the docks, or landmen in search of adventure. With this unlikely outfit, a heavy sailing vessel, an inexperienced commander and a crew of incapable desperadoes, Peter Baker entered upon his privateering venture!

The master was his son-in-law, John Dawson, "who knew enough about navigation to get along somehow". This was considered quite a wise move, for at one time Baker entertained the idea of being captain himself! He christened his ship MENTOR, and, of course, readily obtained the necessary letters of marque. Dawson, after being at sea for a week, decided to return, "not having come across anything worthy of his powder and shot". Falling in, however, with another privateer, he inquired whether she knew of any good prize, or even a formidable enemy, and was told that a 74-gun Spanish East Indiaman had been seen in a given latitude.

Baker resolved to put his fortunes to the test. "I might," said he, "as

well be in a Spanish prison as an English one, for if I return empty-handed, I shall certainly be jailed for debt." So he set sail after the assumed Spaniard, and finding her, made out through his glass that she really was pierced for 74 guns, and appeared in every respect a far more formidable craft than the clumsy MENTOR. Handing his glass to his carpenter, John Baxter, the latter, evidently an observant man, exclaimed that the stranger's guns were all dummies! Thereupon John Dawson bore down to the attack, boarded the enemy and carried her with his harum scarum crew, almost unopposed.

The prize proved to be the French East Indiaman CARNATIC, with a most valuable cargo, said to be worth nearly \$2,500,000. One box of diamonds alone was valued at \$675,000. The crew had been three years in the vessel, trading in gold and diamonds, and did not even know that war had broken out. When the rich prize was brought into the Mersey, bells were set ringing, guns were fired, and both captors and captured were feted by the delighted townspeople. Peter Baker at once built himself a large house, which he called Carnatic Hall. Determined to profit by his want of practical experience when building MENTOR, he and Dawson started as ship builders on a large scale, and again they succeeded. Their yards were situated at the north end of the old King's dock and at the present time a gap in the wall shows where one of their slipways stood. They prospered and built several ships for the British admiralty.

For many years John Dawson treasured a model of the first man-of-war, which he and Baker had built. It can be seen today at Newsham park; but the most singular relic of the extraordinary story is the fact that an organ still in use in a Liverpool church was part of the cargo of the captured CARNATIC. It had been intended by the French for their cathedral at Pondicherry in the East Indies. The original Carnatic Hall was destroyed by fire, but was rebuilt by the Holland family, and there Mr. Holland recently died.

Rogers & Webb, Boston, have chartered the new schooner JAMES M. W. HALL to carry a cargo of coal from Norfolk to Las Palmas. The vessel, a three-master, was launched at Phippsburg, Me., Aug. 15, and is commanded by Capt. H. W. Haskell.

Perils of the Lime Trade Are Many

Spontaneous Combustion is an Ever Present Danger When
Carrying Lime—Fire May Rage Beyond Control for Weeks

By David A. Wasson

WHEN the schooner DUPONT, loaded with dynamite, rammed a sunken pile at Seattle recently there was no explosion that jarred the state of Washington; the vessel only went to the bottom. But when the lime-laden schooner ANN C. STUART got a bump while passing through a drawbridge at Portsmouth, N. H., in November, the resulting leak set her afire. Wherefore, lime seems to prove itself a more dangerous cargo than dynamite.

Yet the lime trade is Rockland, Maine's, chief reason for existence, and furnishes occupation for many of the Pine Tree State's coasting fleet. In the country around that thriving little port are some of the largest deposits of limestone or calcium carbonate in the country.

The calcium oxide or quicklime of commerce, which is calcium carbonate minus carbon dioxide, is prepared by burning limestone in kilns between layers of coal or wood; a perfectly humdrum process. It is the mischievous union of calcium oxide and water to form calcium hydroxide or slaked lime that is the terror of the Maine sea captains. Water is the fire fiend's worst enemy, but it is the strongest ally of demon quicklime. It causes a fierce exothermic reaction that ignites any inflammable substance within reach. The firemen who fight a blaze in a lime cargo work under a peculiarly terrible handicap.

Add to this the facts that the little wooden "limers" are among the oldest afloat, obviously are not as tight as the proverbial cup, and yet ply the year around on one of the stormiest coasts in the world, and it is still easier to appreciate the perpetual hazard that they encounter. Each is a floating volcano. It is said that every vessel of the Rockland lime fleet has been on fire at some time or other, and that she will go up in smoke eventually if she keeps off the rocks and continues in the trade long enough.

There are just two ways of fighting a lime fire. Incipient ones are first treated by caulking every chink in decks and cabins that will admit air to the cargo and starving them by a long siege. But this cannot always be done effectually. Hence a kill-or-cure method is often resorted to, and

one in which the remedy is apt to be worse than the disease. When the flames broke through the deck of the ANN C. STUART in spite of the starvation expedient, she was scuttled and sunk in the harbor. But the cargo of lime casks, its bulk increased nearly a half in the wholesale process of slaking, burst her sides and deck open and virtually ruined her.

Burning lime cargoes play other queer freaks. Six years ago the schooner HERMAN F. KIMBALL put into Portsmouth with a smouldering blaze in her forehold. She was hastily sealed up and stripped of sails and running-rigging; a usual precaution.

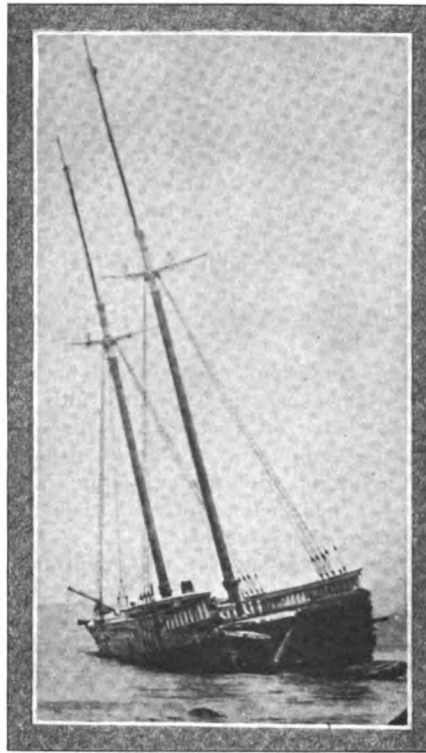


FIG. 1—LIME SCHOONER MARY
AUGUSTA

She evaded her fiery destiny by being wrecked at Kennebunk, Me., July 2, 1914, when loaded with a return cargo of coal

The crew moved ashore and waited developments; while the foremast, slowly consumed below decks, settled into the hold inch by inch until it completely disappeared. In three months the fire subsided of its own accord after eating the forehold to a mere shell. KIMBALL was repaired and is yet afloat.

The skipper of WOODBURY M. SNOW tired of the monotony after his

craft had been devoured internally in Boston harbor for two months. He deliberately got under way and sailed back to Rockland, a veritable bomb with the fuse spitting. It was a literal case of going home to die, but SNOW recovered.

Three years ago ADA AMES sprang a leak and caught fire during a westerly gale off Cape Cod. Smothering tactics did not avail, for the blaze had a big start. The skipper headed for the beach in a desperate race against time. But the Monomoy life-saving crew saw clouds of steam issuing from the doomed vessel, put out and took off her men just as she burst asunder and sank.

There is now only a remnant of the original fleet, for a fleet of barges invaded the field in 1900 and drove many of the craft into other trades. This concern, however, has had its troubles, for its big wooden barge VINLAND was burned at Staten island immediately after her importation from the Great Lakes, while the other steel vessels of the company have by no means been immune. At present this company monopolizes the New York trade, and the windjammers have the Boston business, which consists of smaller consignments than the barges handle.

The surviving "limers" are typical of the fleet in its palmy days; high-sided little double-decked craft with white-painted bulwarks for the most part, and a shippy distinction all their own. Among those now in commission are the schooners WOODBURY M. SNOW, originally NED SUMPTER, built in 1832; HUME, 1843; MARY LANGDON, 1845; THOMAS HIX, 1847; CHARLIE & WILLIE, 1849; MARY BREWER, 1852; HELEN, CATAWANTEAK and ELLA F. CROWELL, each built in 1864; MORRIS & CLIFF, originally SAM WELLER, built in 1868; JOHN J. PERRY, formerly MARY JANE LEE, 1874; JOHN S. BEACHAM and WARREN B. POTTER, built in 1874 and 1883, respectively, the only three-masters in the trade.

The latest of the lime fleet to lose the number of her register was NILE, built in 1856, which was wrecked in the Mussel Ridge channel, Me., on Dec. 8 last. Other veterans of the fleet which have fulfilled their destinies within the last few years are CYRUS CHAMBERLAIN, built in 1848, burned in Portsmouth harbor, N. H.;

ATLANTA, 1848, burned, Maine coast; A. HEATON, 1851, burned off Cape Cod; RISING SUN, 1852, stranded and burned on Wells Beach, Me.; GEORGE W. GLOVER, 1857, burned at Kittery Point, Me.; YANKEE MAID, 1858, stranded and burned on Seal island, Me.; S. J. LINDSEY, 1860, burned and sunk at Boston; LEONA, 1871, stranded and burned at Portland; HASTINGS, 1871, burned at Rockport, Me.; ONWARD, 1871, stranded and burned at Rockport; JORDAN L. MOTT, 1872, stranded and burned, St. George river, Me.; ANNIE L. WILDER, 1872, burned at Biddeford Pool, Me.; JAMES R. TALBOT, 1874, burned in Owl's Head harbor, Me.; FLORIDA, burned at sea.

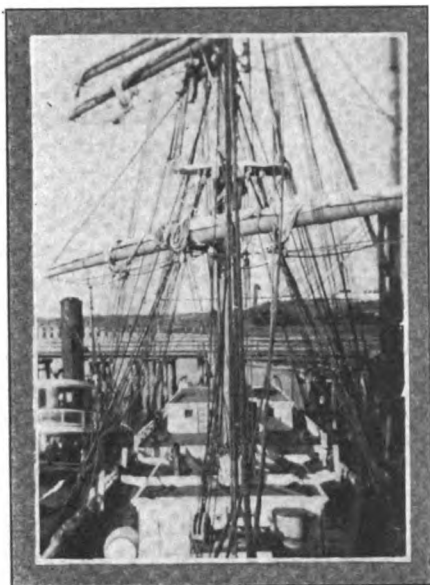


FIG. 2—THE BRIG WILLIAM G. IRWIN
An almost obsolete type now engaged in carrying lime from Roche Harbor, Wash., to San Francisco. Two years ago she was afloat at the latter port for many weeks

Dyson Propellers

Improperly designed propellers cause great waste of power, loss of time and money. To remedy this the American Screw Propeller Co., recently formed, with offices at 1520 Samson street, Philadelphia, designs propeller wheels according to the Dyson method, and under the personal supervision of Captain Dyson, of the United States navy.

Accurate data (based on actual trial performances) is claimed by this company and it is this fact together with Captain Dyson's personal connection with the company, which enables it to state that its designs and the results obtained are satisfactory.

The American Screw Propeller Co. has published a little booklet, containing a short history of the propeller, as well as the necessary data for designing the most efficient propellers. Marine engineers, naval architects, owners and others would find this booklet useful.

How to Steer a Ship

By Capt. George S. Laing

AS THE shipping industry is now in a state of progress that will undoubtedly raise the status of the merchant marine to a higher level and as American ships with their seamen and navigators are breaking into new routes, knowledge of a diversified type is not amiss. Many young officers are entering the noble profession and older men, who have for years run in and out of a few familiar harbors, find themselves on the deck of a new steamer or schooner bound to foreign places never visited before. These conditions call for a rehearsal of some phases of seamen practice. The art of steering and of nursing your craft while at anchor can be designated as a vital consideration, as also is the handling of the much neglected gangway in port.

All 'round helmsmen that can be trusted to make a steamer look straight into an artificial cut or handle the same craft with little persuasion when she is courtesying before a heavy sea or scooping it up with little headway, are not too numerous. In sailing craft, where the springing of gaffs, booms and masts and often the damaging of sails and gear is in many cases the fault of bad steering, the dearth of crack steersmen is also present. The writer is convinced that these conditions exist mainly because the crews are not initiated into the simple laws of pressure, balance and release—engineers would say exhaust. Admonition without instruction is all that a bad helmsman gets from the average ship's officer.

Steering is an art that neutralizes all forces, natural and unnatural, that may act on your ship in regard to her propulsion in a straight line—termed a course. Graceful swinging in a tortuous river is another feature. The forces at work are water friction on the submerged part of the hull, wind pressure on the upper part of the hull and superstructure, and the pounding of seas on any part of ship. Then as subagents in the movement we have draught, heel, speed, depth of water under vessel and minor components, local and temporary, such as propellers, tides, etc. It is essential to mention these things to stimulate the study beyond the spinning around of a modern steam steering engine in innocent oblivion of what one is trying to accomplish.

It will be found that all steamers with bulky and flat bottoms are extremely obstinate in shallow water, and

where shallow water and ebb tide are both with you, steering is in many cases almost an impossibility when bound seaward. On the other hand, if going out against the flood on shallow water, your craft should handle fairly well. She also will behave well if steaming inwards against the ebb. Going in the same direction as any tide or current makes steering sluggish and unreliable, while stemming a tide or current gives better control and steering becomes easier.



FIG. 3—THE SCHOONER HERMAN F. KIMBALL

Fire raged in her cargo of lime for three months, meantime playing the queer prank of devouring her entire foremast inch by inch

The laws of these forces make it imperative for a ship to approach her berth or dock in a "head on" direction to any moving water. Vessels with heels and fine runs aft are easier to steer than the ordinary cargo boat as their displacement gets away quicker.

The Effect of Propellers on Steering

The relation of propellers to steering is important, and in rivers especially, the helmsman should know the effect of one upon the other. Say, for example, that you are steaming up to New Orleans in a twin screw craft and your ship is swinging to port, if the bend is very sharp and your steamer long, it is likely that your port engine should be stopped for a minute or two and may be put half astern till the kink is negotiated. Quartermasters should be drilled in this phase of maneuvers and learn that twin propellers both run

outboard when going ahead, hence giving a perfect balance.

Now take a single screw steamer going around the above mentioned bend, and assume that her screw is right handed and her swing sluggish. What must be done? As probably she will be on a slow or half speed swing, a few seconds of "full ahead" will make her look around that corner quicker than it takes to read about it. The helmsman should be more than an automaton. In side-wheelers, with independent engines, the maneuvering may also be simplified by a little forethought.

As regards steamers in mid-lake or sea with plenty of water under them, the steering problem is governed again by the simple laws of pressure, balance and release. It is a common thing to notice helmsman making a weather course when the wind and sea are fresh and anywhere on the side. Some officers reckon that this offsets the leeway. Perhaps by chance this would be right, but the sacrifice in distance by the yawing both ways in a serpentine manner is unseaman-like and a waste of steam and time. The trouble is that the steersman persists in trying to steady or balance his ship with midship rudder. With the wind and sea in this condition, his efforts are almost futile. In weather like this, the average steamer will balance and keep fairly straight with small helm if the tell-tale indicates about 15 degrees angle of "weather helm", which means, in other words, that if your fresh wind and sea are on the starboard side the rudder should have the above inclination to the port or lee side.

This brings out the fact that all steamers or craft of any kind will fly into the wind's eye even without the helm, so that with side pressures it takes "up helm" or "weather helm" to keep them anything like straight. A great many seamen who pass from sail into steam service are surprised when they find that a steamer's rudder acts in this way, the supposition being that she ought to steady down to straight steaming with the helm amidships.

Dead Before a Howling Gale

With the wind ahead a steamer steers best and steadies with midships helm but generally the test of a good helmsman comes when she is running dead before a howling gale with mountainous sea. A quartermaster who keeps his vessel "right on her course" when wind and sea are aft has the blessings of all on board from cook to captain. This position, of course, is the most dangerous and

as the vessel's stern is raised and lowered as often as the water summits and valleys are negotiated, for the time being, perhaps, the helmsman has the most ticklish job on board. It is hard for some people to realize this, but a little error in judgment, either too little or too much helm at this particular time, may mean washing a man overboard, breaking in a deck house or hatchway or even causing foundering.

Skillful Helmsmen Needed for Sailing Ships

In sail a competent helmsman is also a very valuable man, and he should study the art of steering from very similar points to those of steamboat practice. There are, however, a few items that concern him alone. In squally weather our sail friend must be on the alert to keep his craft from "coming to" and jerking some of the sails or spars out of her. It is, therefore, best if closehauled to try to keep the weather leeches lifting during a squall. The pressure of wind is thus deflected overboard and the ship takes little heel or list. When free, care must be taken not to let her "come to" in the squalls—rather keep a little to leeward of her course. In both these positions your vessel must carry "weather helm" according to strength of wind and sea. When running dead aft with wind and sea, your vessel should balance with midship helm. Only when "hove to" in a gale under head reaching canvas will your vessel carry "lee helm" or "down helm". The two are synonymous. The greatest water pressure is on the lee bow of all sailing craft, hence the almost constant use of angled rudder. This lee bow pressure vanishes when the wing and wing sailing comes into play and midship helm will then be carried.

One of the most important things to practice in steering either in steam or sail is to learn how to "meet" your ship. Say that you tell a man to port two points. In many cases the helmsman will make the craft swing four points. Why is this? Because the impulse of the rudder should have been counterbalanced the moment her head began to swing. Then the normal position of rudder will stop your ship's head at the two points which were ordered.

The beautiful handling of rudders can be noticed to advantage when rounding some roomy bends in a river. A good quartermaster will describe a semi-circle as neatly on the water as you could do on paper with compasses, while another will nearly wrench the steering gear from its

foundation and make the vessel appear to be dodging a submarine. In some ways the steam steerer has made bad helmsmen, as there is no manual labor attached to it, whereas in hand gears or sail the fondness for moving the helm too much is against one's brawn and muscle. Thus men soon learn to balance their craft with as little work as possible.

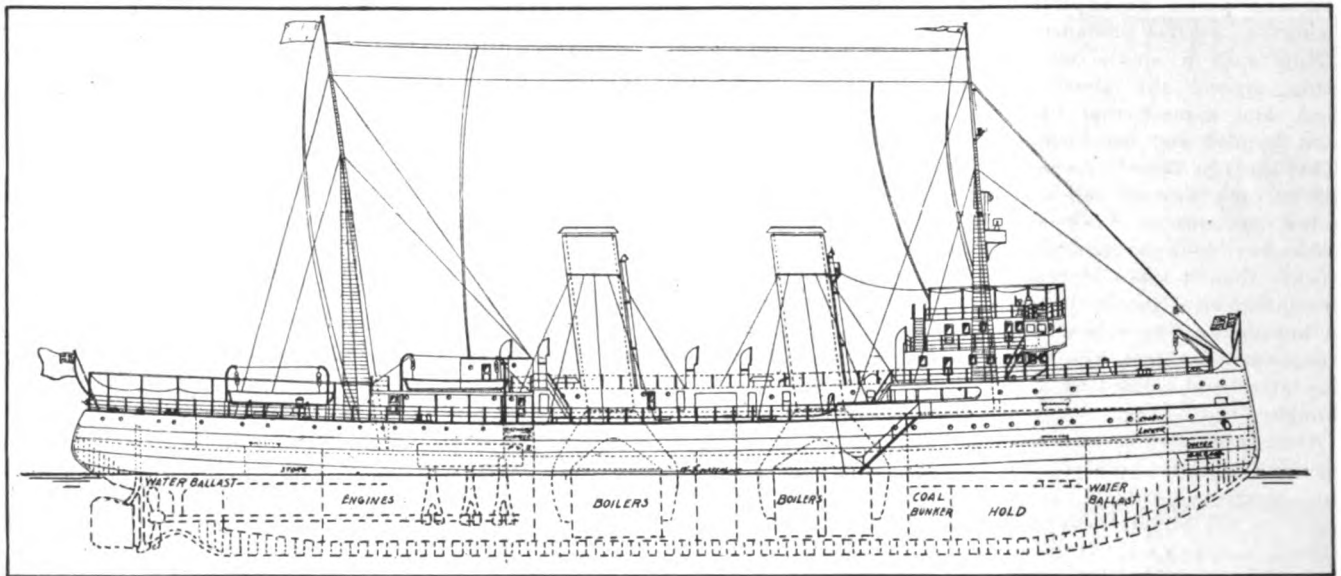
Anyone who figures out what is taking place when using the steering gear of any craft will soon come to understand the art of keeping a ship on her course regardless of the circumstances. Steering in a calm is one thing, in a stiff breeze another, and so on, but I think enough has been said to create an interest and to promote the study of this most important phase of sailorizing. On no account should helmsmen relieve each other when steering by compass course unless the ship is steadied down, and her rudder is in the neutral line that suits the conditions. A wild steering ship handed over to a "gravy eye" quartermaster has very frequently caused heavy damage before she could be tamed down. When telling a man to "port" or "starboard" or "luff" or "keep away", see with your own eye that the order is being carried out.

As a last word on steering, every officer should practice in his mind a routine of his actions in putting his vessel from steam into hand gear or vice versa, and the thing should actually be done when opportunities occur, say before the fall rush, if on a lake boat. How to secure a loose rudder quadrant is a different job on each boat, but generally a few fathoms of slick wire cable with nigger heads nearby will make a thinking man act. With an eye in one end of this wire you save one minute, which often means \$500.

Board Changes Rule

The board of supervising inspectors of the steamboat inspection service has adopted a rule, which has been approved by the secretary of commerce, allowing service on motor-propelled light vessels or lighthouse tenders as equivalent experience for raise of grade of license on vessels navigating the ocean, lakes, bays or sounds to that obtained on vessels subject to inspection by the steamboat inspection service. The paragraph added to the rules reads:

"Service on United States motor-propelled light vessels or lighthouse tenders shall be considered as equivalent experience for raise of grade to that obtained on vessels subject to inspection by this service."



Canadian Government Ice Breaker J. D. HAZEN

New Ice Breaker for St. Lawrence River

THE Canadian government recently launched the ice-breaker J. D. HAZEN from the ship yard of Canadian Vickers, Montreal. The boat was equipped during the summer and will be held in readiness for service on the St. Lawrence river next winter. To what extent the efforts of this ice-breaker will be able to prolong the navigation season is a matter of conjecture. Should J. D. HAZEN master the ice on this great highway of commerce and keep it open to traffic

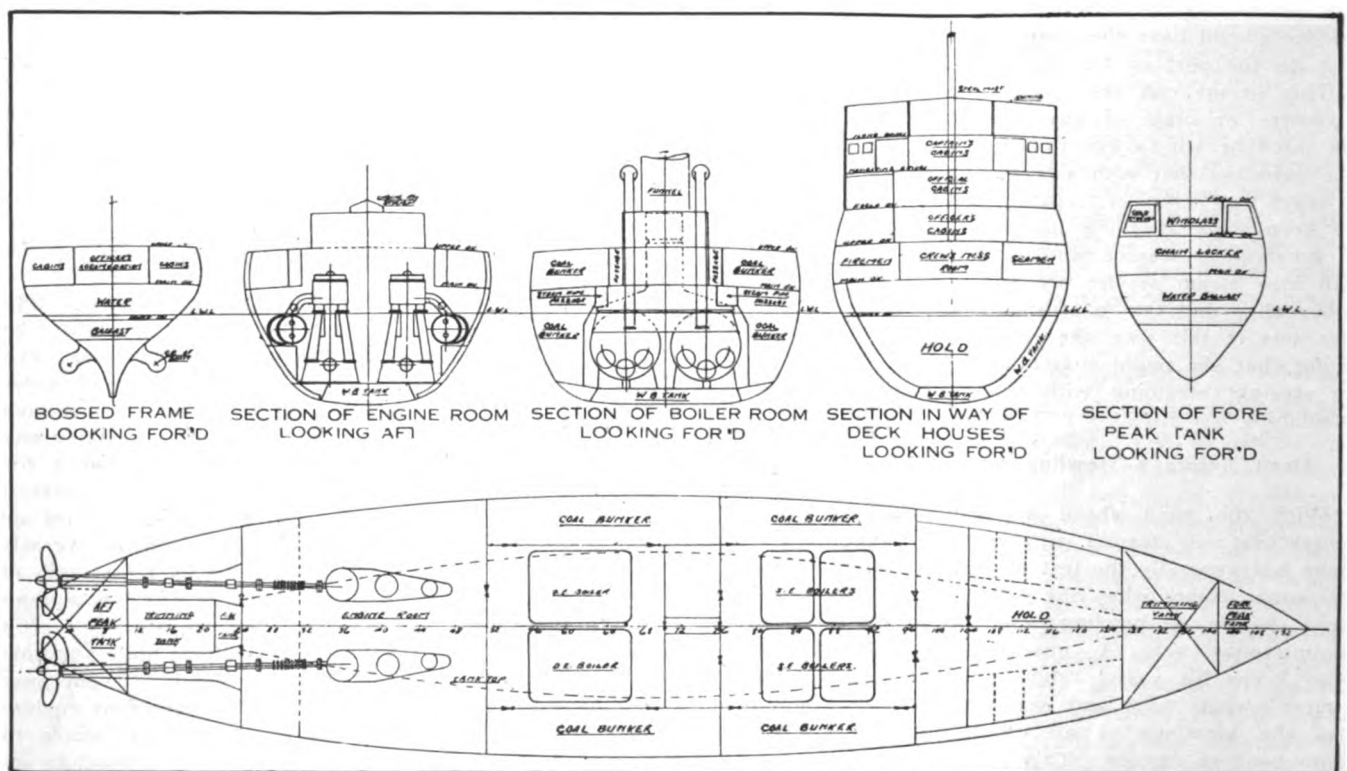
30 days more than usual, it will effect a material improvement on the present situation.

The principal dimensions of the vessel are as follows: Length overall, 292 feet; length between uprights, 275 feet; breadth molded, 57 feet 5 inches; depth molded, 32 feet; draft, mean, 19 feet 3 inches; deadweight on above draft with coal, stores and crew, 950 tons.

Steel construction is used in the hull which is subdivided into seven water tight compartments by transverse bulk-

heads and made unusually rugged to withstand the exceptionally severe strains caused by ice-breaking service. The hull bottom is of the double cellular type, extending nearly the entire length of the boat. This space is used to carry water ballast, about 90-tons capacity being reserved for fresh water storage.

The stem is a massive steel casing, raked aft. The stern is of the cruiser type to facilitate navigating in ice. The side plates weigh 20 pounds per square



HOLD PLAN AND SECTIONAL ELEVATIONS OF ICE BREAKER

foot, the inner space being filled with well seasoned fir closely fitted and bedded in white lead. A 10-foot ice belt extends the entire length of the hull, the thickness being 1.125 inches forward and 1 inch aft. The side bunker walls are water tight to the height of the upper deck. This construction, with the inner skin between the fore peak and the forward bulkhead, forms a double skin extending aft to the boiler room bulkhead. The rudder is an extra heavy casting, while the trunk is of 0.46-inch steel plates riveted to the stern framing with cast steel stuffing boxes having brass glands.

J. D. HAZEN is propelled by two sets of triple expansion, surface condensing engines. The cylinder diameters are 28, 46 and 75 inches respectively. The stroke is 48 inches. All the moving parts of the engine are made of forged steel with a large factor of safety to allow for shocks and strains received during ice-breaking operations. The crank shafts are composed of three interchangeable lengths, connected by solid flanged couplings.

Two double-end and four single-end boilers of the Scotch type are installed. They have a total heating surface of 21,900 square feet, with a grate area of 560 square feet. The boilers operate under forced draft and supply steam at 180 pounds pressure. With this pressure and at 100 revolutions per minute, the engines develop 8,000 indicated horsepower. The coal bunkers are designed for 1,300 tons of coal.

Each water-tight compartment is equipped with both steam and hand pumps. Electrical generating units are provided in duplicate and will supply current for power and lighting purposes as well as for a 24-inch searchlight and a wireless telegraph station. Communication from the bridge to the engine room is effected by means of illuminating, repeating and tell-tale ship telegraph instruments.

The commodious quarters provided for the officers and crew are equipped with a ventilating system and steam heat. Four 26-foot life boats and one captain's cutter provide life saving apparatus in compliance with the law for the ship's crew of 90 officers and men.

The German steamship WILLEHAD, Capt. Jagens, laid up at Boston since the war, shifted to New London, Conn., the latter part of last month for the assumed purpose of housing crews of merchant submarines that may arrive at that port from Germany. At the present time there are laid up at Boston the German steamships CINCINNATI, AMERIKA, KRONPRINZESSIN CECILIE, KOLN, WITTEKIND and OCKENFELS; also, the Austrian steamship ERNY.

Easy to Go Through Canal

Government Has Worked Out System for Convenience of Ship Masters—Complete Stock of Supplies on Hand

THE attention to detail which was so important in the completion of the Panama canal, is also evident in the manner in which the canal organization looks after the needs of ships using the waterway. So careful and complete is this attention that there is no need for intermediary agents, as has been supposed. *The Marine Review* gives herewith a summary of the more important points operators of shipping through the canal should know. More extensive information may be obtained from *Sailing Directions* and *General Information*, issued by the Panama canal. This is a booklet of 115 pages, thoroughly explicit and carefully indexed, in which are covered all matters involved in handling vessels through the canal. Copies are in the hands of United States consular officers all over the world, and in the offices of the collectors of customs at United States ports, or at United States branch hydrographic offices, and have been furnished to the principal governmental and commercial maritime agencies of the world. The booklet also may be obtained on application to the Panama canal, Washington, D. C., or Balboa Heights, Canal Zone.

Tolls and Other Charges

It is necessary to place funds on deposit to cover the tolls of a vessel before she will be allowed to enter the canal. This deposit may be placed with any assistant treasurer of the United States, one of whom is situated at any of the larger United States ports; or with the assistant auditor of the Panama canal in Washington, D. C.; or with the collector of the Panama canal, Balboa Heights. The first method seems to be the most convenient for operators, as it is the one most generally used.

In case deposit is made in the United States it is advisable to request at the time of making deposit that cable advice of same be sent to the canal, in order that there may be no delay when a vessel presents herself for passage.

Foreign operators may handle such depositing with equal simplicity, by directing their bankers or shipping agents to have the deposit placed with the assistant treasurer in New York or San Francisco, for instance.

The canal organization has been developed to handle the passage of

vessels complete and to attend to their needs in the way of tolls, coal, supplies, cables, mail, etc., without delay or red tape, and there is no need for operators to employ local agents for vessels which come to the canal for the sole purpose of passing through it, without taking on or discharging freight or passengers in canal waters. In fact, the interposition of a third party in the arrangements for a vessel which is simply passing through the canal is liable to result in confusion and delay. In other words, a local agent may be needed for commercial purposes, in looking after cargo and passengers if vessels handle either at the terminal ports; but he is not needed to look after the requirements of the ship herself as far as going through the canal, communicating, taking on supplies, coal, etc., are concerned.

Refunding Balance of Deposit

As soon as a vessel has cleared from the canal, a statement of her expenses is forwarded to her operator, with a check on the treasurer of the United States for the balance of the deposit. In the case of lines having frequent passages through the canal it is permissible to allow such balance to apply on account, but the statement of each vessel's expenses for each passage is sent in all cases.

Tolls on loaded commercial vessels are charged at \$1.20 per net vessel ton, or each 100 cubic feet of actual earning capacity, the net tonnage being determined by the rules for the measurement of vessels for the Panama canal. Deck load is charged for in addition, at \$1.20 per 100 cubic feet of space occupied by deck load. On vessels in ballast the toll charge is 72 cents per net vessel ton, Panama canal rules of measurement.

These basic charges have been modified, however, by the ruling that loaded vessels shall not pay more than the equivalent of \$1.25 per net ton, as determined by the rules of measurement for United States registry; and ballast vessels shall not pay less than 75 cents per net ton, United States registry measurement.

Hence, vessels coming to the canal for passage should have certificates of measurement according to the Panama canal rules and also according to the rules of United States registry. These certificates can be issued at the ports of entry to the canal, but this

might cause several days' delay to a vessel.

There is no charge for pilotage on vessels passing through the canal which do not stop at either terminal port to discharge or take on passengers or cargo. Also there is no charge when they stop at terminal ports for the purpose of taking on coal, supplies, etc. Pilotage charges when levied are port charges and not a part of the expenses of passing through the canal.

The only additional expenses to which a vessel may be put for canal transit proper would be for services rendered necessary by the condition of the ship. Such are charges for furnishing extra men on deck to handle the lines in passing through the locks, when the ship's crew is not sufficient; and tug service for sailing vessels or steamships in condition requiring assistance. Under such conditions the tug charge is \$15 per hour; or for complete transit of the canal, 10 cents per net canal ton, or 4 cents per displacement ton, with a minimum charge of \$150.

Coal and Oil Supply

Coal is supplied to vessels at both terminal ports, at the rate of between 400 and 700 tons a day. The facilities are being improved. The present prices for delivery from lighters, trimmed in bunkers, are \$5.40 per ton, when handled by ship's gear, at Cristobal; and at Balboa, \$6.40. These prices will advance to \$6 and \$7, respectively, on Sept. 1. The coal is Pocahontas standard.

Fuel oil may be obtained at either terminal from plants of the Panama canal or from private corporations, at the rate of about 1,600 barrels an hour. The price from the canal is \$1.25 per barrel of 42 gallons, sold as dry oil at the local temperature, with subtraction of the amount of water contained, as shown by analysis. Prices from the corporations may be obtained on application to them. Diesel engine oil is for sale by several corporations, one of which quotes a general price of \$10.80 per ton of seven barrels.

Supplies in unlimited quantities, including meats, cold storage products, groceries, fruits, vegetables, etc., as well as ships' supplies—lubricants, cordage, ships' chandlery, standard articles for ships' use—can be purchased from the Panama canal in either of the terminal ports and delivery can be made on short notice. By governmental regulation these goods are sold at fixed prices very slightly above cost.

Ice is furnished for 30 cents per 100 pounds at Cristobal and 35 cents

per 100 pounds at Balboa. Laundry is handled quickly and no advance notice is required.

Repairs to vessels may be made to any extent, except where the use of a large dry dock is required or the turning of the largest crank shafts or longest line shafts.

Ships are boarded by a boarding officer immediately on arrival. He furnishes price lists and takes orders for all kinds of supplies or fuel. Any supplementary orders or requests for any kind of services may be sent to the captain of the port, communication with whom is always easy.

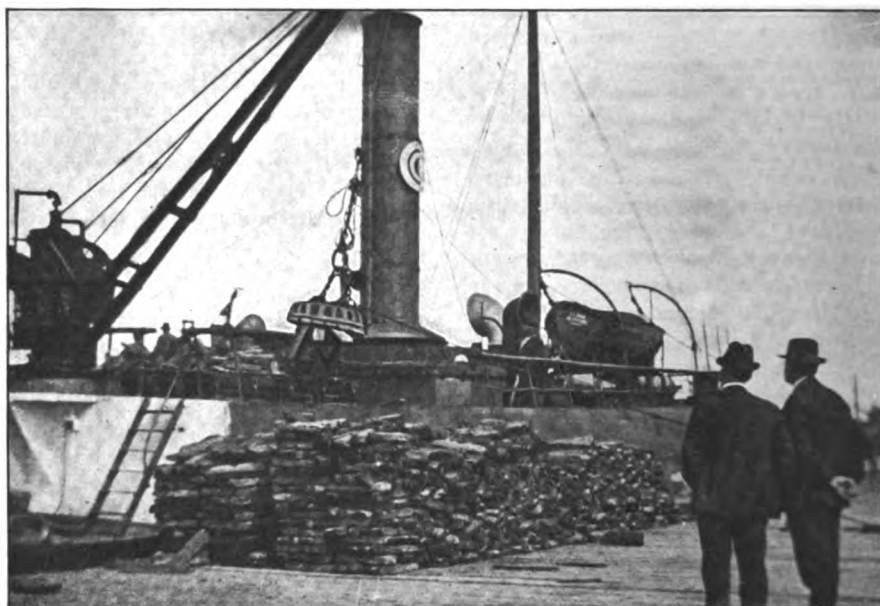
The captain of the port of entry is the local executive with whom, or his authorized immediate representatives, the master of a vessel coming into the canal will have dealings. His office is the clearing house for all

Magnet on Lake Boat

The freighter CICOA, a Great Lakes vessel, is now employing electric lifting magnets to handle her cargoes of pig iron. The application of magnets to this purpose marks an interesting advance in freight handling methods as it is the first time that pig iron has been handled by a ship's own equipment of magnets. The accompanying illustration shows the magnets handling their first load.

The use of the magnets dispenses with the services of the usual gang of longshoremen. It is stated that the loading cost of the first cargo of 2,000 tons of pig iron was only \$100 with the magnets, whereas the employment of longshoremen would have cost from \$500 to \$600.

The magnet equipment comprises three



LIFTING MAGNET LOADING PIG IRON ON STEAMER CICOA AT ASHLAND, WIS.

business with the ships, and is the local marine headquarters. It gives out chronometer comparisons, nautical information as to charts, sailing directions, etc., delivers and receives mail, and has supervision over the delivery of coal, supplies, etc., to vessels.

While by no means necessary it is advantageous if vessels can advise in advance when they will arrive, by mail, cable, or radio. Mail is received five times a week from the United States, and approximately a week after posting. The canal is equipped with three radio stations, two for areas within 1,000 miles of the terminal ports and one which has a sending radius of approximately 3,000 miles.

Communications should be addressed to the Panama Canal, Balboa Heights, Canal Zone. The cable address of the canal on the Isthmus is 'Pancanal.

36-inch circular magnets furnished by the Cutler-Hammer Clutch Co., Milwaukee. One man operates each magnet, a fourth attendant being employed for taking care of the generator. With all three magnets working, the net weight of pig iron lifted from the dock is 4,500 pounds.

Lifting magnets have previously been installed on docks for handling pig iron in and out of vessels. Two Cutler-Hammer magnets were installed on the dock of the Inland Steel Co., Indiana Harbor, Ind., in 1910 and unloaded 2,000 tons of pig iron from the freighter ERWIN L. FISHER in 10½ hours.

The freighter CICOA is owned by the Charcoal Iron Co. of America, Detroit. She will be employed exclusively in carrying pig iron from the company's Lake Superior and Lake Michigan docks to Buffalo.

On the Coasts, Lakes and Rivers

What's Doing and Who's Doing It

Busy Fall Days on the Lakes

By A. A. Eiben

INDICATIONS are that lake ship yards will have about all the business they can handle during the coming winter. Many steamers will be reconstructed and a large amount of repair work is being planned. Several plants have already contracted for considerable repair work in addition to orders for new vessels for delivery during next year. The steamers OCTOBARA, TIONESTA and JUNIATA, of the Great Lakes Transit Corporation's fleet, will be remodeled during the coming winter. These vessels, now package freighters, will be converted into passenger steamers, at a cost of approximately \$500,000, and will be operated in the passenger trade exclusively between Buffalo and Duluth. It is planned to install in these vessels every convenience to be found on modern ocean liners, including luxurious dining rooms, parlors, dancing pavilions and other attractions. Passenger accommodations will be increased from 338 to 600 on each vessel, and every stateroom will be an outside room.

The new steamer EMORY L. FORD, built by the American Ship Building Co. for the Franklin Steamship Co., left the Lorain yard on Aug. 26 on her maiden trip.

The steamer COL. JAMES M. SCHOONMAKER, belonging to the fleet of the Shenango Steamship & Transportation Co., Cleveland, unloaded the largest coal cargo ever brought to Duluth-Superior harbor, on Aug. 24. She carried 14,520 tons from Ashtabula to the west Duluth Carnegie dock, exceeding her previous record by 111 tons.

Capt. Hugh Harrity was recently placed in charge of the coast guard station at Lorain, to succeed Capt. W. W. Griesser, who was retired on pension. Capt. Harrity was formerly in charge of the coast guard station at Fairport, O., and Buffalo.

The ice crusher ST. IGNACE, formerly used as a car ferry on Lake Michigan and later engaged in ice-breaking at the Canadian head of the lakes, was destroyed by fire on Aug. 31. ST. IGNACE was built in Detroit in 1889 and was in dry dock at the plant of the Western Dry Dock & Ship Building Co., undergoing repairs when she caught fire.

It is reported that the New York Central Railroad Co. will erect a new grain elevator at Oswego, N. Y., to cost approximately \$2,000,000. This elevator is

to be of the cylindrical type, made of reinforced concrete, and will be similar to the big elevator built by the Metcalf Elevator Construction Co., at Midland, Ont. The Metcalf company has been asked to bid on the work.

The steamer CORSICA left the yard of the Buffalo Dry Dock Co. on Sept. 6, in two parts, for Montreal, where the sections will be rejoined and the steamer will proceed to New York to enter the coastwise trade. CORSICA was purchased by the Coastwise Steamship Co. several months ago.

Joseph C. Hughes, of Willcox, Peck & Hughes, marine underwriters of New York, died at his home in that city Aug. 27. Mr. Hughes was one of the best known average adjusters in this country, and was about 72 years old.

The Canadian steamer SARONIC, which was destroyed by fire recently, was beached on Cockburn island, Lake Huron. It is thought that part of the steamer's grain cargo may be saved.

The steamer GETTYSBURG, towing the barges ARENAC and ALEXANDER ANDERSON, cleared from Lorain on Aug. 22 for Montreal. These vessels were recently sold to New York interests, and will leave for that port after discharging coal at Montreal.

The oil carrier DAWNITE, building for the Standard Oil Co., of New Jersey, was recently launched at the plant of the Toledo Ship Building Co., Toledo. DAWNITE is the third vessel for the Standard Oil Co. to be launched this season, and will be ready for her trip to the coast by Oct. 15.

The wooden steamer THOMAS DAVIDSON, recently purchased by the Crosby Transportation Co., Milwaukee, will be rebuilt at Muskegon, Mich., and will enter the fall grain trade. DAVIDSON is 286 feet long and 42 feet beam and has been idle for the past six years.

An order was recently issued by Judge K. M. Landis, of the federal court at Chicago, restraining the Great Lakes & St. Lawrence Transportation Co. from selling nine of its fleet of vessels to the French government. The order was granted on action of the Scranton Coal Co., Scranton, Pa., which alleges that it has a three-year contract with the transportation company, commencing last spring, by which the latter company

agrees to use its vessels to ship 400,000 tons of coal annually to Duluth, Chicago and Milwaukee.

The north dock of the Kelley Island Lime & Transport Co. at Kelley Island, Lake Erie, near Sandusky, was destroyed by fire on Sept. 4. More than 1,000 tons of stone fell into the lake as the dock was consumed. The origin of the fire is not known and the loss will exceed \$5,000.

A new record in handling ore was made by the port of Ashtabula during August, when 1,880,688 gross tons were received, surpassing the record made in July by 150,275 tons. In addition, 764,506 tons of coal were handled, nearly twice the amount handled in July.

On Puget Sound

By F. K. Haskell

Immediate undertaking of a study of currents along the Pacific coast is announced by Dr. E. L. Jones, superintendent of the United States coast and geodetic survey. "The Pacific coast has been somewhat neglected in this regard," said Dr. Jones during a recent visit to Portland, "but congress has given us a more liberal allowance for the study of currents this year—some \$11,720, as compared to \$5,600 last year—and the greater portion of this sum will go to Pacific coast studies. No adequate study of currents or tides can be made in a short space of time, for the study must go over an extended period to be able to ascertain if there is a recurrence of conditions. I cannot say so without knowing the facts, but it is possible that the currents had something to do with the recent wrecking of the steamer BEAR, and there is no doubt but what many wrecks that have taken place on this coast have been due, in part at least, to currents." Dr. Jones attaches particular importance to surveys being made in Alaskan waters by use of the wire drag for pinnacle rocks.

Contracts for three 8,800-ton steel freight steamers, representing an investment of approximately \$2,500,000, have been closed by J. F. Duthie & Co., Seattle. With the award of the contracts for the big craft came the announcement that Duthie & Co. have completed plans for new ship building yards. The new steamers are for Norwegian interests and were ordered by Hannevig & Johnson, ship brokers, New York. The steamers will be equipped

with geared turbines. Their boilers will be built in the northwest.

* * *

For the first time in the history of north Pacific shipping, Puget sound and Portland exporters are approaching a grain season without a single wheat carrier chartered for the United Kingdom. Lack of tonnage due to the European war is given as the cause for this unusual condition. The British bark BIRKDALE, chartered some time ago by Hind, Rolph & Co., San Francisco, for the United Kingdom, will get a rate of 150 shillings, the highest ever known for this trade. "It looks as if there would be very little grain shipped through Pacific coast ports this season," said Robert C. Hill, of the Seattle merchants' exchange. "Exporters at the present time are making arrangements to ship overland by rail and then by water across the Atlantic to the United Kingdom or the continent. They are opening branch offices at Atlantic and Gulf ports with this in view."

* * *

The Canadian Pacific railroad liner EMPRESS OF RUSSIA recently discharged at Vancouver the most valuable consignment of raw silk goods ever shipped from the orient. The cargo was valued at \$3,500,000.

* * *

Repairs to the Japanese steamer KENKON MARU No. 3, which was wrecked on Belle Chain reef, Mayne island, British Columbia, Jan. 12, will represent the biggest contract of its kind ever awarded on the north Pacific. KENKON MARU sustained extensive damages. The keel aft was pushed up about 18 inches and the steel plates buckled and pierced. A large portion of the keel will have to be replaced and many new plates will be required. Owing to the fact that the vessel has been submerged a long time, all running gear on board is rusted and in bad condition.

* * *

Making the run up from Talara bay, Peru, to Puget sound in 54 days, the American schooner WILLIAM ALSON has arrived in Port Townsend and will return to the west coast with lumber. At Talara bay, the Standard Oil Co. is making extensive enlargements to its plant and is constructing an enormous concrete pier for handling cargo.

* * *

The McCormick steamship line, Portland, Ore., announces a reduction of \$1 in the first-class fare between Portland and San Francisco. The company operates KLAMATH, CELILO, WILLAMETTE, MULTNOMAH, WAPAMA and SAN RAMON.

On the Chesapeake

By Hollis F. Bennett

The Coastwise Ship Building Co., Baltimore, has been awarded a contract to build six wooden, three-masted seagoing coal barges, for the Philadelphia & Reading railroad. The new barges are to be 207 feet long, 30 feet beam and will carry approximately 2,000 tons of coal each. The contract price for the barges is reported at \$500,000. The ship building company is negotiating for the building of a

four-masted schooner of about 2,500 tons capacity.

* * *

The Huasteca Petroleum Co.'s tug MEXPET set a new record for coastwise towing this month in delivering at Baltimore the Norwegian three-masted ship VIK and the Norwegian bark ALEXANDRA from New York in the remarkable time of 72 hours. MEXPET is a new oil-burning tug and was built by the Staten Island Ship Building Co., Port Richmond, N. Y. She has a compound engine with cylinders 20 x 42 x 28 inches at 175 pounds steam pressure.

* * *

The United States dredge, SAN PABLO has arrived at San Francisco after a voyage of 40 days from her builders' yards at Baltimore. SAN PABLO was commanded by Capt. John Moreno and was built for dredging operations in San Pablo bay, California.

* * *

The new machine shop of the Maryland Steel Co., Sparrows Point, is nearly completed and will probably be in full operation during the latter part of September. The new ship shed, building way and new offices for the

ship yard will be finished by the first of the coming year. It is reported since the control of the company has been taken over by the Bethlehem Steel Co. that two new dry docks will be built capable of docking the largest vessels afloat.

* * *

The lighthouse department has the new lighthouse and wireless station on the island of Mavassa well under way. Mavassa is a bird island owned by Baltimore fertilizer interests and has not been worked for several years.

* * *

The British steamship BAYTRONTO will leave the latter part of the month for France with the American barge WAVERLY in tow. Both boats will be loaded with grain. This is the second grain tow to leave this port for France, the first being CHARLES F. MAYER with the barge POILS.

* * *

The steamer ERICSSON, of the Baltimore and Philadelphia line, hit a submerged obstruction last month in the Chesapeake and Delaware canal, and sank. The passengers were landed safely and were sent to Philadelphia by train.

Philadelphia Wide Awake

By Joseph Fenerty

FURTHER evidence of the expansion of ship building on the Delaware is afforded by the announcement from New Castle Del., of the formation of the Delaware Ship Building & Engineering Co., with a capital of \$1,000,000. The new concern has purchased 11 acres on the Delaware for a yard.

* * *

The steel barge, DR. BROOKS, launched Aug. 10, at the plant of the Clinton Ship Building Co., has been sold by the owner, James J. McNally, to the Cia-de-Maderg Co., of Antilla, Cuba. She will be used in the lumber trade between Abaco and Cuba.

* * *

A conference was held recently in the chamber of commerce, Philadelphia, between officials and owners of steamships in an effort to place in operation a line between Philadelphia and the east coast of South America. The transportation bureau of the chamber will guarantee 1,500 tons of freight each month. Philadelphia has 600 firms engaged in export trade and they will be solicited. Efforts will likewise be directed to nearby cities to induce South American shipments via Philadelphia.

* * *

Furness, Withy & Co., Ltd., Philadelphia, have announced that they have secured a controlling interest in the Prince Line steamers, owned by the Prince Line, Ltd., of New Castle-on-Tyne, comprising upwards of 40 vessels ranging from 2,000 to 6,000 tons each.

* * *

The United States ship FRANKLIN, a steam screw frigate, built more than half a century ago at a cost of over \$900,000, has been bought by Henry Hitler Sons & Co., Philadelphia, for

\$17,000 and will be destroyed for the copper, iron and other metal in the hull. FRANKLIN was built in 1864 and was a sister ship to WABASH, MINNESOTA, MERRIMAC, ROANOKE and COLORADO. She was constructed of live oak throughout. Her length is 265 feet 9 inches; beam, 54 feet 3 inches and draft, 21 feet. She carried 39 guns and was rated at one time as the most powerful craft of her type in the world. She was receiving ship at Norfolk since 1874. She will be towed to Eastport, Me., and broken up there.

* * *

The strike of the riveters and other iron workers at the ship yard of the Harlan and Hollingsworth Co., Wilmington, Del., has been settled and the men have returned to work.

* * *

The barge DETROIT, the remodeled light United States cruiser of the same name, was rammed and sunk in the Delaware, off Kaighn's point by the Clyde Line steamer DELAWARE, Captain French in command. Capt. Mathison, of DETROIT, and eight members of the crew jumped overboard and were picked up by boats from DELAWARE. The liner was uninjured and proceeded to New York. Witnesses of the collision state that the barge was lying in the river with proper lights. The barge was loaded with a cargo of molasses. She will be raised and repaired.

* * *

In the presence of an immense crowd of spectators, estimated to number more than 10,000, the first launching in 10 years took place in Chester, Pa. on Aug. 26, when the steel oil freighter MALMANGER, safely left the ways of the newly organized Chester Ship Building Co. MALMANGER was built for Westfall Larsen, of Bergen, Norway. Mrs. C. M. P. Jack, wife of the president of the

company, was the vessel's sponsor. More than 1,000 specially invited guests were present representing virtually all branches of marine interests. The vessel is 400 feet long, 54 feet beam, 32 feet deep, 26 feet draft, and will be capable of about 10½ knots speed. She will carry 8,800 tons of oil. The on-tract price was \$1,000,000.

* * *

The Middlesex Transportation Co., New Brunswick, N. J., has established freight service between Philadelphia, Trenton, New Brunswick and New York, via the Delaware and Raritan canal. Sailings for the present are weekly. A daily service is planned.

* * *

SUNOIL, a steel oil carrier, built by the Cramp Ship Building company, Philadelphia, for the Sun Oil Co., of Chester, Pa., was launched on Aug. 31. Miss Mabel A. Pew, of Ardmore, sister of J. Howard Pew, president of the Sun company, was sponsor. The vessel was built for the transatlantic trade. She will carry 10,000 tons of oil in bulk and is the largest vessel owned by the Sun company.

* * *

CITY OF DOVER, which sank in Jones Creek, Del., several weeks ago, has been floated by the Cramer Wrecking Co. and towed to Cooper's Point, N. J.

* * *

The schooner FREDERICK A. DUGGIN, which left Fowney, England, for this country on Feb. 15, 1916, arrived in Philadelphia Aug. 11 with a cargo of China clay. After numerous vicissitudes the vessel was sighted by the gunboat MARIETTA, when 600 miles off shore. She was a leak and was towed to port by the government vessel. The crew, covered from head to foot with the clay, looked like wraiths of seamen returning from the bottom of the sea.

Inside the Golden Gate

By A. A. Willoughby

The longshoremen's strike which has prevailed at Pacific coast points for some months was the cause of a great deal of congestion, particularly in San Francisco harbor. However, the San Francisco strike was settled independently of the other ports and conditions have been rapidly returning to normal. The lumber interests were unequivocally in favor of the open-shop plan for handling cargoes. This led to a great deal of trouble, but a new stevedoring company, fostered by the lumber interests, has been formed and now all cargoes are handled promptly by its employees.

* * *

The arrival of the non-magnetic yacht CARNegie is being looked forward to with a great deal of interest. The yacht which has been cruising in the South Pacific will come to the Golden Gate for a general overhauling and will be in the local harbor at least a month.

* * *

The rebuilding of the barge NUUANU into an ocean going oil tanker has been completed. She has been placed in service between Seattle and Martinez. The latter port is the terminus of the Shell Oil Co.'s pipe line from the California

oil fields. NUUANU was formerly a clipper, working in the sugar trade between Hawaii and Delaware breakwater. Later she served as a barge on Puget sound. Her power plant consists of semi-diesel engines.

* * *

The American steamer REPUBLIC, formerly the German boat WALKURE, which was raised last winter by Sudden & Christensen in the Papeete harbor, will shortly be turned over to her new owners. She will go north to load lumber for Antofagasta, later steaming for New York where she will go into the Atlantic trade.

* * *

The Great Northern steamer MINNESOTA which has been in San Francisco harbor since early in December owing to power plant troubles, expects to make a trial trip some time in September after an extensive overhauling at the Union Iron Works.

* * *

The arrival of BLACKHEATH, owned by the British admiralty, carrying coal from one American port to another for the United States government affords another illustration of the shortage of ships flying the American flag. She carried 7,000 tons from Newport News to California City.

* * *

The largest shovel-type dredge ever constructed on the Pacific coast is being built in the J. A. Johnson yards, Alameda, Cal. The dimensions of the hull will be 148 x 70 feet with a depth of 14 feet. The shovel boom is to be 230 feet long. The dredge is being built for the Hercules Dredging Co. for use on the upper Sacramento river in central California.

* * *

The new wooden motor schooner CITY OF PORTLAND is at present on a trip to Australia with the largest lumber cargo ever carried in a wooden steamer. She carries 2,008,000 feet. A great deal of interest is being taken in the trip as it will determine to a large extent the future trend of ship building operations on the Pacific coast.

* * *

CITY OF PANAMA, formerly a Pacific Mail boat, which has been lying in the mud of Mission bay in the south harbor of San Francisco, has been raised. The boat had been declared a menace to navigation and was about to be blown up when Melville Taylor took the contract to raise her.

Boston Harbor

By George S. Hudson

The steamer WILLIAM CHISHOLM, which sank in the Cape Cod canal and obstructed traffic, has been blown up and removed. The vessel was carrying about 2,000 tons of coal from Newport News to Boston. About 1,500 tons of the cargo was salvaged.

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Fourteen dollars a ton is the rate on coal to be taken by the four-masted schooner HENRY F. KREGER, Capt. Brown, from Norfolk to Lisbon.

* * *

J. L. Drake has been transferred from New Orleans to the office of the U. S. steamboat inspectors at Boston as

assistant inspector in place of William Tod, resigned.

* * *

The three-masted schooner MYSTIC, formerly HOPE HAYNES, has been sold to Capt. Mueller and will engage in general cargo business between the United States and Cape de Verde. The schooner was built at Wiscasset, Me., in 1880, and rebuilt at Mystic, Conn., in 1908. Price paid was about \$12,000.

* * *

After a 10-days passage the steam-netter PEREGRINE arrived at Iceland from Boston to engage in the herring fishery with market at Stavenger, Norway. PEREGRINE was formerly a yacht owned by R. H. White, a Boston merchant, and is now owned by Capt. C. M. Hoie, Stavenger.

* * *

Heavy receipts of mackerel and swordfish were noted at Boston during August, the crew of the steamer ORION receiving \$126 each for two days' work with the seines. A swordfishing trip of the schooner RICHARD NUNAN stocked \$4,200 for 162 fish, the crew sharing \$246 each.

* * *

The paddle steamer MARY CHILTON, built by William McKie, East Boston, has been delivered to the Nantasket Beach Steamship Co. CHILTON is 205 feet long and cost \$235,000, having accommodations for 2,000 passengers.

* * *

Manuel De Suza has purchased the two-masted schooner GEORGIETTA for use as a packet between New England ports and the Azores. The vessel for years was engaged in the fishing industry out of Gloucester, Mass., and Boston.

The Mississippi Delta

By H. H. Dunn

The American freighter ADMIRAL CLARK, formerly RUTLAND, built at Cleveland in 1906, foundered two miles off Cape San Antonio, on the night of Aug. 17, according to the six surviving members of her crew who were brought to New Orleans Aug. 29 by the Swedish bark TANA. Twenty lives, including that of Capt. James Daniels, were lost. ADMIRAL CLARK was first hit by the tornado about 112 miles southeast of Cape San Antonio, Cuba, and 80 miles south of the Isle of Pines, at 8 a. m., Aug. 16. By 11 p. m., of the same day, she had been driven to within two miles of the cape, and there foundered. ADMIRAL CLARK struck one of the long reefs which stretch out from Cape San Antonio like the fingers of a giant hand, and, before her crew could take to the boats these small craft were smashed to kindling. Six members of the crew, however, managed to get on a painting raft and cut loose from ADMIRAL CLARK before she went down. These men drifted in the sea until Aug. 22—six days—before they were picked up by TANA. The survivors are Garland Roth, chief officer, American; Carl Johnson, second officer, American; W. Robertson, third engineer, British; C. H. King, steward, American; Peter Anderson, sailor, Norwegian, and Fred Cusik, oiler, Austrian. ADMIRAL CLARK was 242 feet long, and 25 feet deep; 2,320 tons gross and 1,668, net. She was owned by the Pacific-Alaska Navigation Co., Tacoma, Wash.

Red Hot Tips From the Trade

Pertinent Suggestions and Personal Gossip

THE navy department has announced its intention to re-engine some of the ships that are now equipped with direct-connected turbines. The first two to be re-equipped will be the destroyers HENLEY and MAYRANT. These are to be equipped with geared turbine units, for which contracts have been placed with the Westinghouse Machine Co., East Pittsburgh, Pa. Geared turbines have been selected because they are lighter and take up less space than the direct-connected units. They also are said to reduce steam consumption at all speeds. This reduces the fuel consumption and increases the steaming radius, which is an important feature.

HENLEY was built by the Fore River Ship Building Co., Quincy, Mass., and was completed in the fall of 1912. The main machinery consisted of two direct-connected marine turbines with two compound cruising engines, which were connected to the main turbine shafting by means of jaw clutches. The turbines had 14 ahead and two reverse stages. Steam was supplied to the turbines at a pressure of 250 pounds by water-tube boilers using oil fuel. The new machinery, to be supplied by the Westinghouse Machine Co., will include two complete expansion geared turbine units of the impulse-reaction type and two geared cruising units. This equipment will be installed in the same engine room space and will be connected to the existing propeller shafting, driving the propellers at the same speed as the old units. The two main turbines will each have a capacity sufficient to move the ship at a speed of 15 knots per hour. Reduction gears will reduce the turbine speed of 3,000 revolutions per minute down to 640 revolutions per minute on the propeller shaft.

MAYRANT was built by the Wm. Cramp & Sons Ship & Engine Building Co., Philadelphia, Pa., and was delivered to the government in 1911. The machinery consisted of two turbines without cruising engines. The turbines were designed to develop 13,000 shaft horsepower at a speed of 650 revolutions per minute with a steam pressure of 250 pounds gage. They had 16 stages ahead and seven stages astern. Steam was supplied by four water-tube boilers. Oil was used for fuel, as in HENLEY. The new machinery to be furnished will be essentially the same as that for HENLEY. The main turbines, however, will each have a capacity of 7,000 shaft

horsepower at a speed of 629 revolutions per minute. The revolutions per minute of the turbines will be 3,000.

Air Tools in Ship Yards

Although pneumatic tools have been used since they were first introduced for ship building and other dry dock work, the importance of these small, portable machines was never so fully realized as it has been since the recent unprecedented activity in the ship building industry. The volume of work in American ship yards has created an unusual demand for air drills and hammers which has led manufacturers to investigate the peculiar conditions to which these tools are subjected in ship building to determine the types of tools best suited for this service. Among the makers of such tools that have conducted a series of tests is the Independent Pneumatic Tool Co., Aurora, Ill., which makes a complete line of modern air driven tools suitable for use in the construction of ships and in general dry dock work. These tools, with various accessories, are found to be useful on such work as drilling and reaming bulkheads, boring out stern frame eyes and pintells and on corner bars. Small types are recommended for reaming bolt holes and similar work up to 3/4-inch while larger sizes are made for boiler shops where they are used in stay bolt drilling and tapping and other work requiring heavier drills. The weight of these drills varies from 10 to 40 pounds. Among the special machines which have been developed for use in ship yards are a reversible wood boring drill and an air grinding machine, besides a series of riveting and chipping hammers.

Whistle Control

The McNab Co., Bridgeport, Conn., manufacturer of nautical and engineering appliances, describes a new improved steamship whistle control in a recent bulletin. This device is designed to eliminate the faulty operation of whistles which results from condensation in the steam line, by installing a valve at the base of the pipe adjoining the boiler casing and by draining off through a special outlet any condensation which may take place in the pipe between the valve and the whistle. The operating valve being placed but two or

three feet from the boiler makes it easily accessible for inspection and repair. The entire whistle pipe is therefore kept free from moisture and when the valve is opened, the blast of the whistle will not be impaired by saturated steam and hot water. The valve, which may be controlled with electricity for automatic fog signals or for Morse signals, is operated by a small pilot valve by which the energy required to open the main valve is reduced to a minimum. In addition to the valves provided with automatic timing mechanism and hand lanyard control as a standby, more simple styles are made which provide only the hand lanyard control.

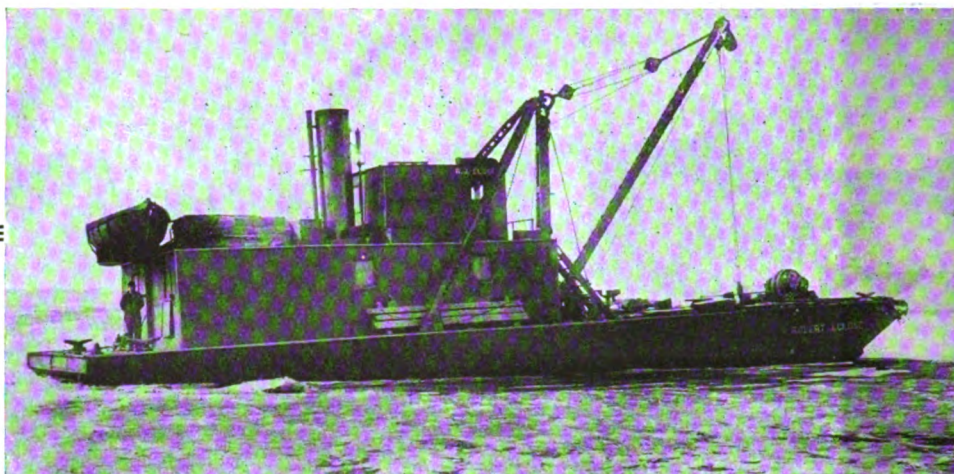
Marine Paint

Silica-graphite paint, manufactured by the Joseph Dixon Crucible Co., Jersey City, N. J., is widely used for marine work, especially for hatch combings and other iron work on Great Lakes steamships. Several years ago at a meeting of superintendents of lake steamers such use of a graphite paint was strongly recommended. The Dixon company states that the natural mixture of flake silica-graphite, mined at Ticonderoga, N. Y., gives an unusually enduring film. There are many other uses for silica-graphite paint in marine work, not only in the engine department, but in the deck department, and as silica-graphite paint is said to have an exceptionally long life, its economy for arduous marine use is obvious.

George Plant, Whitney-Central building, New Orleans, has severed his connection with the Vogemann interests and has started a steamship and ship brokerage business in his own name, representing the Norway Mexico Gulf Line and the Transatlantic Steamship Co.

The address of the main office of the Goldschmidt Thermit Co. has been changed from 90 West street to the Equitable building, 120 Broadway, New York.

The Chicago office of the Ashton Valve Co. is now located at 608 South Dearborn street, Transportation building



MARINE REPAIR STEAMER "ROBERT J. CLOSE"

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GREAT LAKES and SALT WATER SERVICE.

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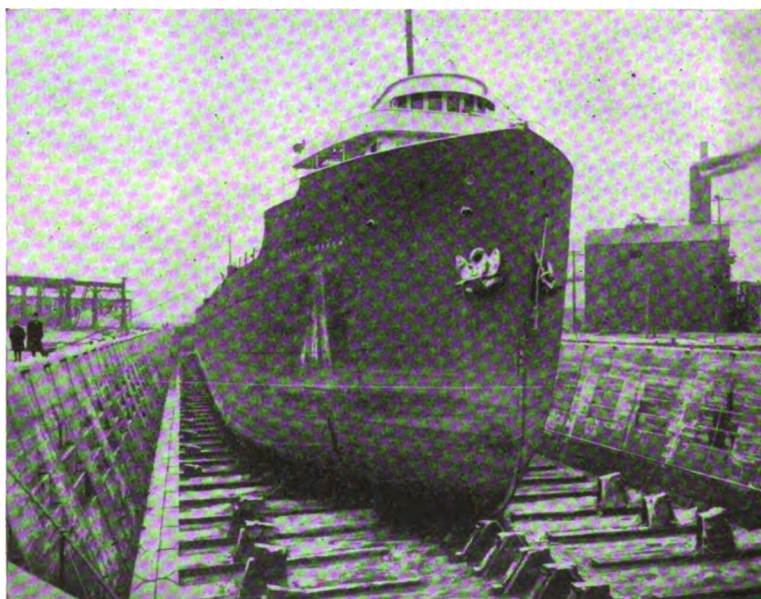
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or
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Any Size



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Dry Dock

	Feet
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Width:	
At Top -	103
At Bottom -	88
Depth -	22½

We Operate the Largest Graving Dock on Lake Michigan
Complete Facilities for Rapid Repair Work
Shops and Dry Dock at South Chicago

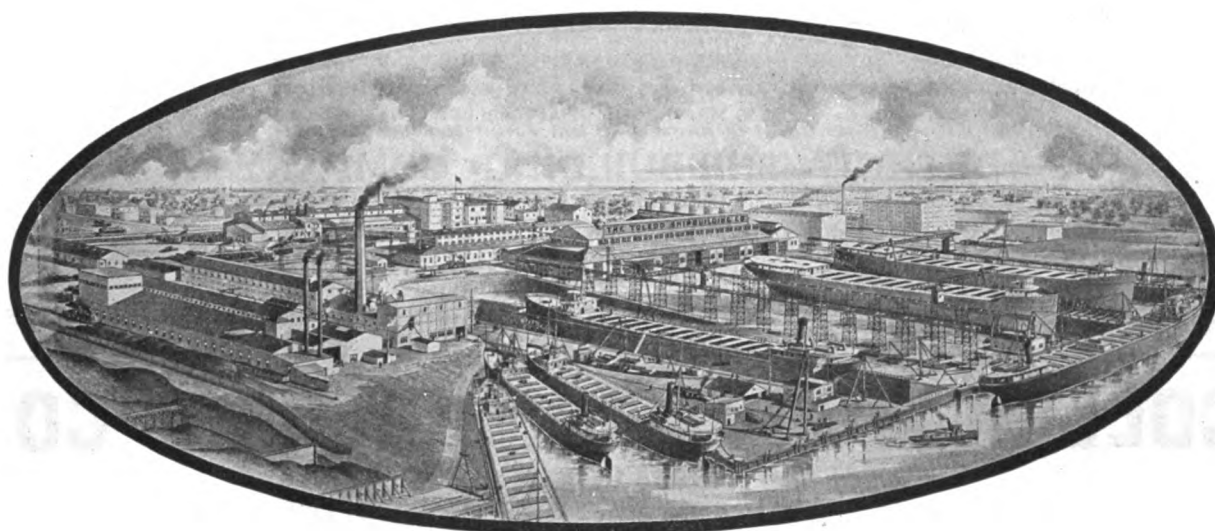
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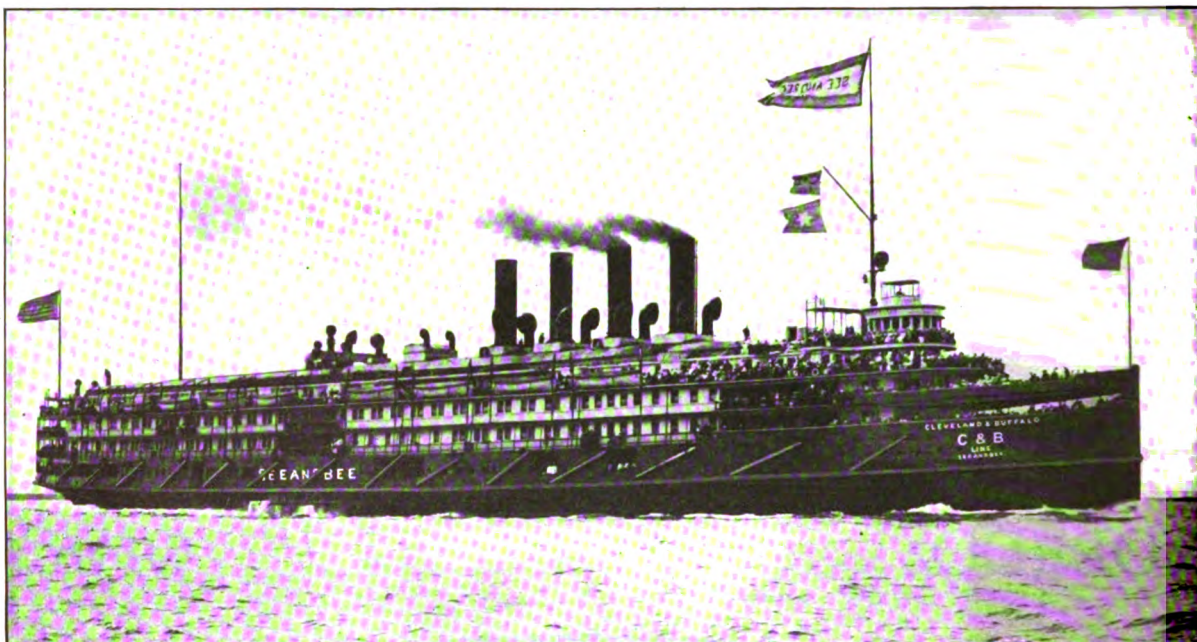
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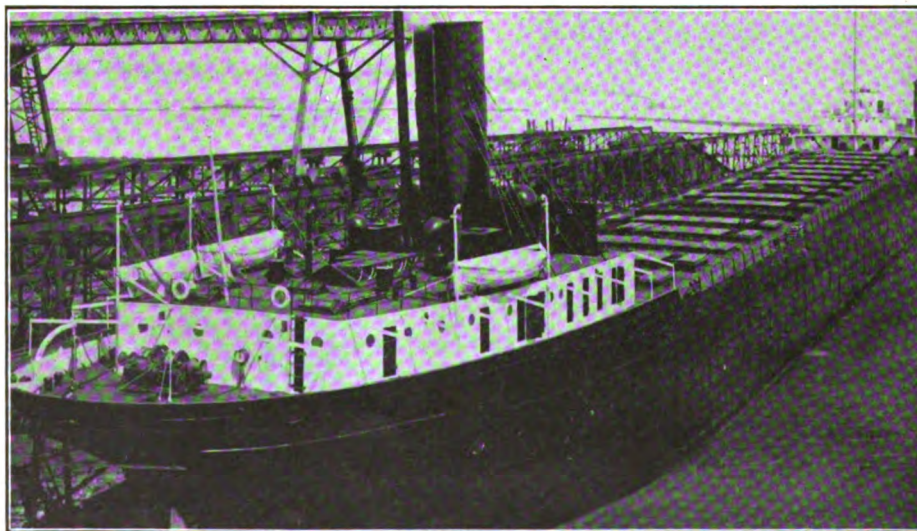
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 EQUIPPED TO
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Owners who are contemplating the construction of new vessels, of any type whatever, will find this system of construction most advantageous and suitable for all trades.

580 vessels of all types and sizes, representing about 4,466,000 tons deadweight carrying capacity, have been built or are now on order, including a good many repeat orders from owners who have tried the system.

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Milwaukee Dry Dock Company

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Ship Repairs of All Kinds

ALSO MACHINE SHOP FOR ENGINE REPAIRS



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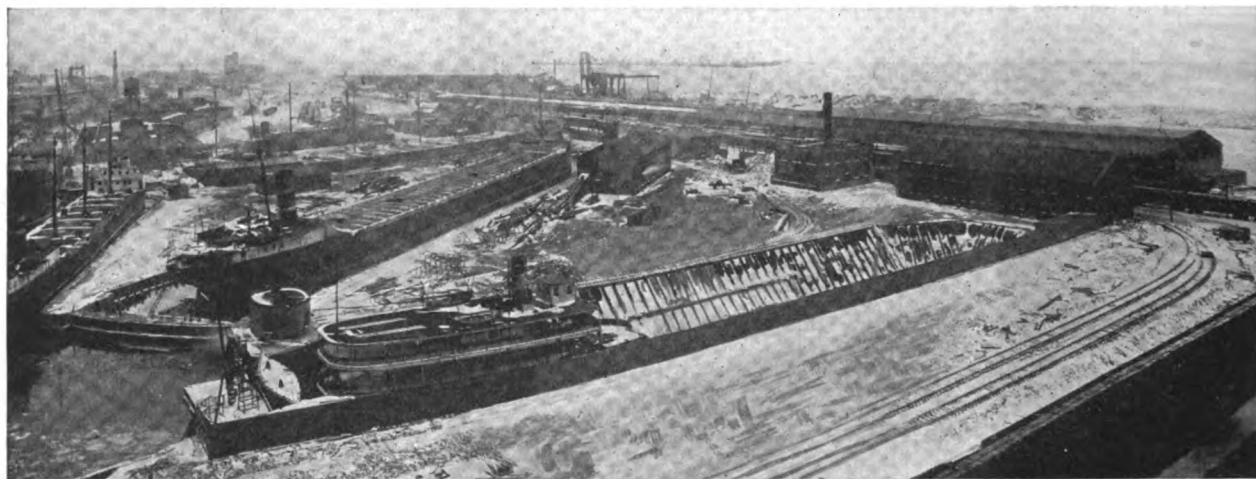
We have two ship yards offering every facility for the repair of both steel and wooden vessels. South Yard Dock is 450 feet long on keel blocks; 460 feet over all; 60 feet width of gate and 16 feet over sill. West Yard Dock is 312 feet on keel blocks; 45 feet width of gate and 12 feet over sill. Rudder pit in each dock. Electric light for night work.

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For repairing Hulls, Boilers and Engines for large and small vessels, tugs, power boats and yachts.

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Two Docks, coupled with Complete Shop Facilities, cut repair periods to a minimum

Length on Keel Blocks, feet
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Draft Over Sill at Low Water

Upper Dock	Lower Dock
600	437
62	50
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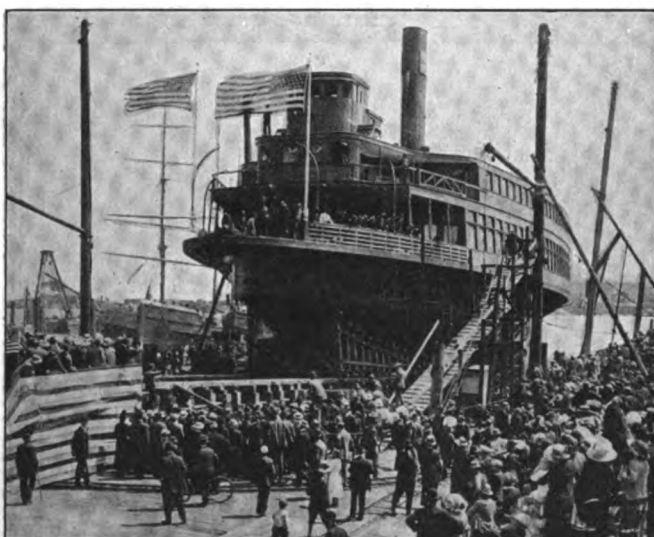
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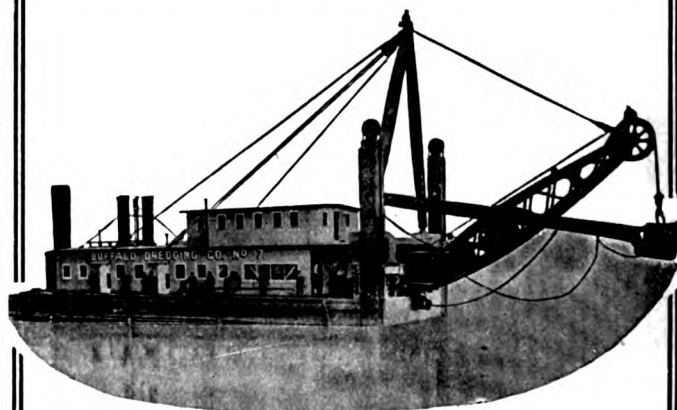


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Engineers and Ship Builders

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MODERN MARINE BOILERS and STEEL SHIP BUILDING



TUGS, PASSENGER STEAMERS
and SPECIAL CONSTRUCTION

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BATH, MAINE

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Particular Attention Given to
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Paint, Varnish, Whitewash, Kalsomine, Duster and Floor Brushes amounting to \$56,451.59, when the White Squadron went around the world. It received the best brushes in the world at lower prices than all other offers. Appreciating WHITING-ADAMS brushes highly, the United States Navy Department has ordered of the same kinds of brushes large quantities every year for many years. Send for illustrated literature.

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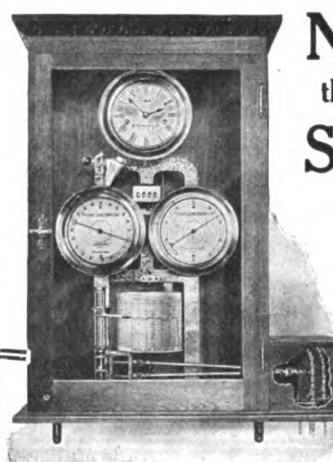
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Gives the mile-
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The Barton Steam Trap

For General Use on Steamboats



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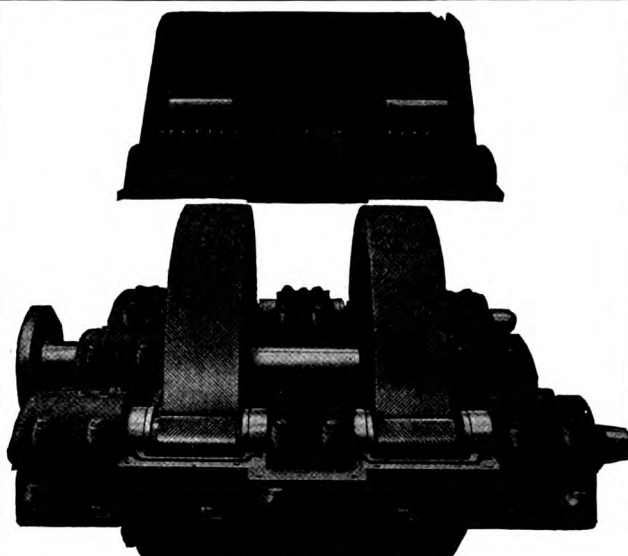
Write to our nearest office for prices and deliveries on Waterbury Cordage. Also Waterbury "Green Strand," "Armored" and "Fibreclad" Wire Rope.



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Use DE LAVAL Geared Marine Steam Turbines

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At present over 6500 De Laval Double-helical Speed-Reducing Gears are in successful operation.

De Laval Gears are built by highly skilled workmen, from the best materials, and with equipment developed and improved by over 20 years of experience.

All factors entering into the design have been chosen after long experience under practical operating conditions, and all parts are made on a limit gage, interchangeable basis.

The De Laval Double-helical Speed-reducing Gear is not an ingenious idea based upon imperfectly developed theories, but an accomplished fact.

It is based upon the principle that a correctly cut gear, correctly mounted and protected from external distorting forces, will run smoothly and noiselessly and will not be subject to excessive wear or deterioration.

If interested in saving weight and fuel, and in the greater simplicity and lower first cost of geared turbines for ship propulsion, write us, giving particulars of the proposed boat so that we may supply full information.

We are prepared to furnish marine steam turbines and gears in any capacity and for any steam conditions.

DE LAVAL Steam Turbine Co. TRENTON, N. J.

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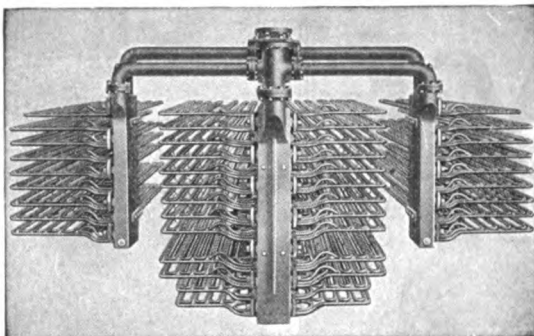
EIGHT REASONS WHY

1. It is adaptable to either new or existing boilers of the fire tube type and can be applied with no change in design or construction.

2. It renders possible an increase in output of boiler horse power from a given boiler plant, 10% to 20%.

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¶ If your Scotch Boilers are Eckliff-equipped, they're hot at the bottom and steaming at highest efficiency.

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DIXON'S SILICA GRAPHITE PAINT

THE LONGEST SERVICE PAINT

Mother Nature has worked for ages to get the combination of Flake Silica-Graphite, the pigment in Dixon's paint. This combination has given Dixon's Silica Graphite Paint unusual qualities for resisting acids, storms, rust and other corrosive elements. Records show that two coats of this metal preserving paint properly applied have protected metal work for fifteen years.

We will gladly send you Booklet No. 77B., which explains further about this durable paint.

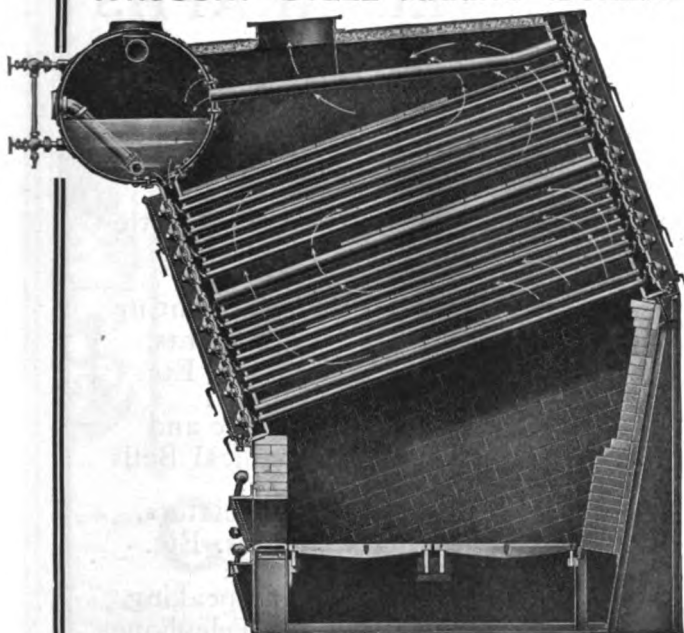
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ESTABLISHED 1827

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GENERATING TUBES EXPANDED. NO OTHER JOINTS. NO NIPPLE CONNECTIONS. NO STAYBOLTS.

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The records for Economy, Capacity and Endurance in the Navies of the World, are held by

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Marine Water-Tube Boilers

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Moreover, the same superior characteristics have been proved in the Merchant Marine.

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Isn't such a great reduction in coal bills of very great interest to you?

All essential parts of Babcock & Wilcox Boilers are heavier than the corresponding parts in Scotch boilers, thus giving greater security against corrosion.

Let us send you full details explaining why "Babcock & Wilcox" stands for safety, ease of cleaning and simplicity of operation.

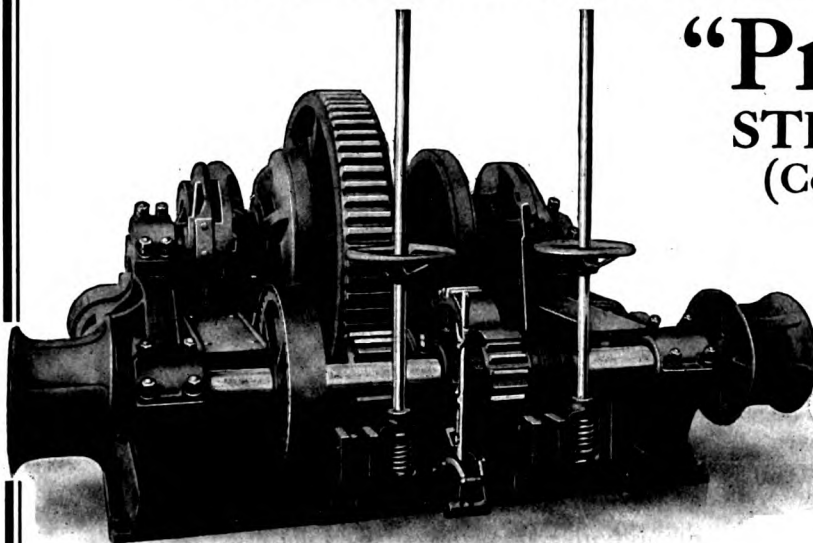
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NEW YORK and LONDON

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"Providence" STEAM WINDLASS (Compound Spur Gears)

has another kind of *pull*, and plenty of it. It has 15 per cent more *pull* than the worm geared types and at 50 per cent faster speed. You have been looking for just this combination. Our price will please you, too.

Write us today.

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SUCCESSORS TO AMERICAN SHIP WINDLASS CO. AND WILLIAMSON BROS. CO.

MACHINISTS AND FOUNDERS

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Unequaled Water Pressure at trivial expense

Used extensively on Steam Ships, Barges and Wrecking Steamers.

THE VANDUZEN "L" Steam Jet Pump

Will raise its respective quantity of clear or sand water per hour, 50 feet vertically.

Can be used with hose and nozzle for fire purposes, etc. Made in several sizes.

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Cincinnati, Ohio



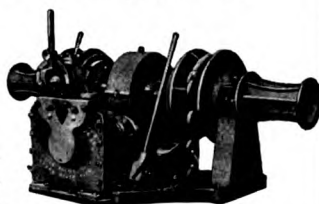
STEAM STEERING ENGINES CAPSTANS WINDLASSES MOORING HOISTS DRILL HOISTS SPUD HOISTS, ETC.

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Loud Speaking
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Chas. Cory & Son, Inc.

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If you already have steam power, connecting up a G-E generating engine is by no means difficult.

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Electric power can be put to scores of other uses besides eliminating the fire hazard.

The cost of installing electricity on shipboard may be saved many times over in a single day.

Write our nearest offices for further information.

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Electric Bake Ovens
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6301

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Steel Ships for Ocean Service

The good ships JOHAN MJELDE and GIJONES lifted anchor recently and sailed from the yards of the American Ship Building Company at Cleveland for far away Norway. Also the GISLA and GAUTE and VESTLAND have sailed from our yards at Detroit and NORDAL from south Chicago. These six ships for Norwegian service are built to Lloyd's rules for ocean service and will carry approximately 3200 gross tons deadweight.



Bow of Norwegian steamer built on the Great Lakes showing part of cargo handling equipment.

Five large plants with the most modern equipment insure rapid construction

Our five complete shipbuilding plants located at Cleveland, Lorain, Detroit, South Chicago and Superior, Wis., are fully equipped to build vessels of any class for lake, ocean, sound or river service, and in addition our plants at Buffalo and Milwaukee have every facility for promptly handling repair work.

We also furnish and install all kinds of marine and stationary engines, boilers, windlasses and auxiliary machinery.

The American Ship Building Company

CLEVELAND, OHIO

M. E. FARR, President

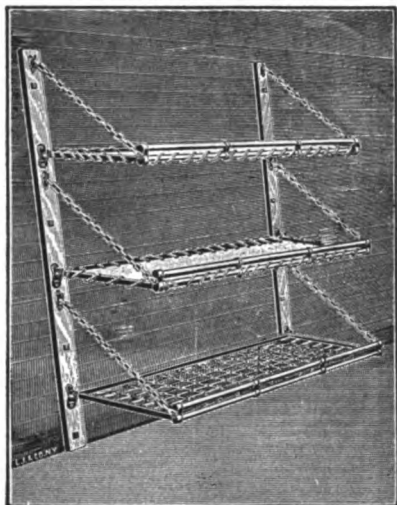
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MANUFACTURERS OF

**Metal Berths and Bunks
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IF you want to experiment—you won't be interested in the WAGER PATENT IMPROVED FURNACE BRIDGE WALL. BUT if you want a bridge wall that has in it five years of making good; a bridge wall that is turning the marine industry away from the antiquated fire brick; one that insures less smoke, minimum upkeep, greater efficiency and backed up by responsible references including all the leading railroad, freight and passenger steamer companies, private yacht owners, stationary plants and others—you WILL be interested in the WAGER BRIDGE.

This isn't argument, or persuasion, or contention. It's just simple, provable facts. May we prove these facts to you?

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ELECTRIC WHISTLE OPERATOR

The simplicity of installation is one of the many advantages over all other electrically controlled Whistle Valves, saves time, material, weight, maintenance and cost.

Eliminating instruments and wiring in wheelhouse.

Eliminating the use of Electric Motors for operating.

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PROPELLERS**

"S.M.B." Manganese Bronze will test from 75,000 lbs. to 80,000 lbs. per square inch ultimate Tensile strength.

"Tensilite" (bronze) will test from 90,000 lbs. to 105,000 lbs. Tensile strength.

DYSON

PROPELLERS

gain efficiency through the thinness of their blade. Capt. C. W. Dyson of the U. S. Navy is the recognized authority on screw propulsion. His book—"Screw Propellers and Estimate of Power, for Propulsion of Ships"—is the *last word* in Propeller designs.

Our Stock Propellers run from 10" to 36" diameter.

We also make the largest bronze propellers.

We are now making three propellers 16' 9" in diameter, weighing about 9 tons each.

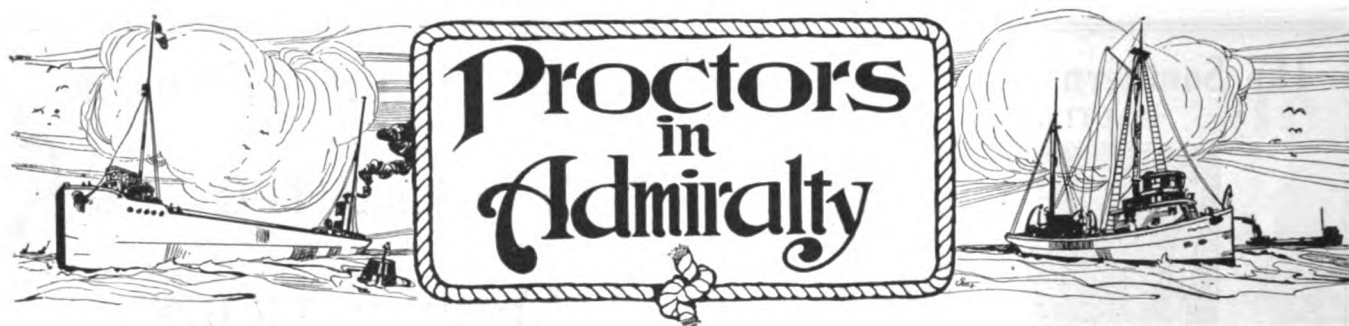
Economize upon weight and cost.

Eliminate your waste propulsion power.

AMERICAN MANGANESE BRONZE CO.

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This directory is maintained for the benefit of vessel owners and operators who occasionally require the counsel and service of experienced Admiralty Proctors.

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Proctors in Admiralty

Sault Ste. Marie

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Each of the ads on this page is a seed planted in a large circle of vessel owners. It grows by repetition until it bears the fruit of business.

323

Do you handle Admiralty cases?

Yes?

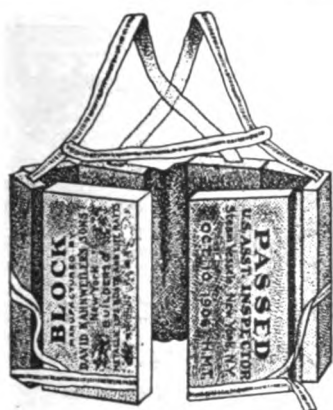
Why not do a little shouting—you can handle more? You have a vast field of prospects, BUT, what are you doing to introduce yourself to them?

322

This page of Admiralty Proctor's cards is a directory for the vessel owner or operator. You can have your card in this directory at a surprisingly low cost.

321

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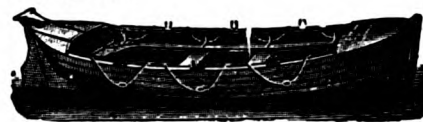


Solid Block Cork Life Preservers

Warranted 24 pounds. Buoyancy and full weight of Cork and Workmanship as required by U. S. Inspectors.

SAFEST CHEAPEST
SOLID CORK LIFE PRESERVERS
RING BUOYS AND FENDERS

Approved and adopted by U. S. Board of Supervising Inspectors. Also adopted by the principal Ocean, Lake and River Steamer Lines as the only Reliable Life Preserver. Awarded four Medals by World's Columbian Exposition.



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METALLIC LIFE RAFT
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Lifeboats, Rafts, Davits

Famous for their QUALITY and ECONOMY

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ESTABLISHED 1837

Diving Apparatus and Submarine Armor
Fire Department Supplies
The Morse Monitor Nozzle

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Cork Cushions, Fenders, Cork Ring Buoys

"Ye Oldest Cork House in America"

ESTABLISHED 1865

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McArthur Jacob's Ladder



This ladder embraces several new features which have been dictated by experience and is the ideal ladder for use aboard ship.

It is now made in sections of any desired length. The sections can be instantly connected by means of snap hooks, adapting the ladder to light or loaded conditions of ships and eliminating the telescopic feature of the former type.

The cable is of plow steel combining lightness with great strength; the steps stamped sheet metal with two-tooth prongs giving a firm foothold; hooks bronze and rivets copper.

The ladder can be compactly rolled up for storage.

"We beg to advise that the Jacob's Ladder furnished the steamer Castalia during season 1913 has proven very satisfactory indeed. The master, Capt. W. L. Girardin, reports that these ladders should be installed on all the boats as they are very efficient and much safer than the old style roper ladder."

The Brown Steamship Company, Cleveland.

McArthur Portable Fire Escape Co.
CLEVELAND OHIO

The McArthur Jacob's Ladder is patented and all infringements upon it will be prosecuted

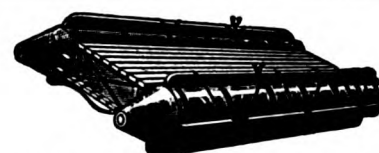


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WILMINGTON, DEL.

Sole Builders of the

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Wooden Boats of all classes.



Outfits for Lake Steamers a Specialty

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MARINE INSURANCE AGENTS

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Residence { W. C. Richardson, Doan 404

'Phone { John T. Kelly, East 3610
Clarence E. Richardson, Eddy 492**Co-Operative Grain Trimmers**

Fort William, Ontario

Let us Trim your Steamers
We know how

W. L. Cook, Manager

Phone—South 184

D. SULLIVAN

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HUTCHINSON & CO.

VESSEL AND INSURANCE AGENTS

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Res. C. L. Hutchinson, Marlo 244
Res. W. H. McGean, Garfield 274

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Cleveland

VANCE & JOYS CO.

VESSEL AND INSURANCE AGENTS

1004-1006 First National Bank Building

TELEPHONE MAIN 3907

MILWAUKEE, WIS.

Vessel and Insurance Agents—Everywhere

Need *The Marine Review* back of them today more than ever before because the prestige of the paper is constantly increasing.

The very men in the marine field—the actual boat owners and operators—whose business you wish to obtain can be effectively reached thru this paper and at a trifling cost.

The price of two good cigars a day applied to *Marine Review* publicity will enable you to substantially increase your business, and the possibilities should prompt you to make early reservation.

Tell us you're interested and we'll submit rates.

THE MARINE REVIEW

Cleveland, Ohio

230

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IF YOU ARE A LIVE ONE

Here Is Your Opportunity!

OUR Great Lakes Representative having entered business in New York, this territory is open to the right man.

PNEUMERCATOR CO., Inc.

118 LIBERTY STREET

NEW YORK CITY, N. Y.

A FALL CRUISE?

If you're thinking of a cruise this fall, no matter where it is, or what kind of boat you make it in, you'll want this new book—

The Power Cruiser's Pilot

Written by Bradford Burnham, a man who has cruised most of the waters of North America, both along the coast and on the lakes, in every kind of craft imaginable. ¶ He gives you the benefit of all his experience in this complete handbook of power boat cruising. It tells the equipment needed for cruises of different lengths and in various waters, and is full of useful hints and suggestions for cruising comfortably and safely.

The only book of its kind ever written. Get your copy NOW. Send us your name and address and a one dollar bill, and tell us to send you "The Power Cruiser's Pilot." Then leave discomfort and worry behind when you weigh anchor.

But DON'T WAIT

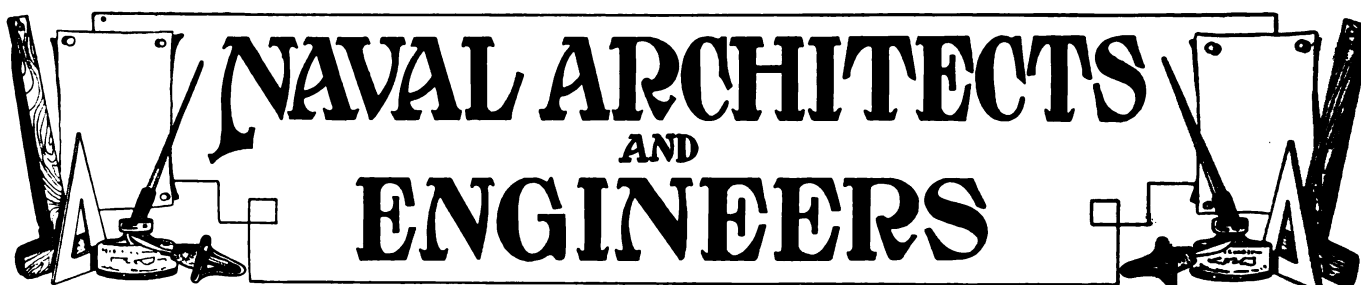
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Cleveland, Ohio

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BABCOCK & PENTON

ENGINEERS AND NAVAL ARCHITECTS

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EDWARD P. FARLEY CO.

Vessel Brokers

Naval Architects and Engineers

Passenger and Freight Steamers, Tugs, Lighters, Self-Propelled Canal Barges

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SURVEYOR TO LLOYD'S REGISTER OF SHIPPING

Plans and Specifications furnished for all types of vessels. Careful attention given to superintending construction and repairs.

Instructions on Theoretical and Practical Shipbuilding by Correspondence.

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CONSULTING MARINE ENGINEER

NAVAL ARCHITECT

All classes of vessels and machinery designed
Tests and surveys made

308 Walnut St.

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PHILADELPHIA, PA.

WILLIAM T. DONNELLY

Designer of Floating Dry Docks, Steel and Wood.

PLANS ON HAND FOR DOCKS FROM 2,000 TO 20,000 TONS

Electricity applied to Marine Transportation

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Consulting Engineer and Naval Architect

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NAVAL ARCHITECTS

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Offices: London Glasgow Montreal

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Telephone No. 1

Joseph Kidd & SonMARINE ARCHITECTS
AND SURVEYORSShip and Engine Damage and Other Surveys
Carefully Attended To

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DULUTH, MINN.

When you think of books, think of Penton.

We can supply any book in print.

PENTON'S BOOK NEWS

Penton Bldg.

Cleveland, Ohio

552

Every Professional Man Knows

The value of the right kind of publicity but few actually apply that knowledge to their business.

The man who constantly keeps his name before the readers of a trade paper that reaches every branch of the industry in which he is interested is the one who prospers.

Mr. Marine Architect—Mr. Marine Engineer! If you are not advertising in *The Marine Review*, and you want to attain greater success, an ad. on this page will bring the desired results.

You need this service—let's start something for you in the next issue.

Write today for rates.

THE MARINE REVIEW

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Cleveland, Ohio

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For Every Part
of Every Ship

B. P. S.

Trade Mark Registered

Best Paint Sold

MARINE PAINTS

For the sake of appearance, service
and economy use B. P. S. Marine
Paints.

You'll be very pleased with results.
Write our nearest branch for full
information and prices.

The Patterson-Sargent Co.
Cleveland Chicago New York

SHEET PACKING



There are many kinds
of **sheet packing**.
Some kinds give service
for but a **short** time.
These, regardless of
cost, are **expensive**.

Other kinds give **long**
service—**profitable**
service. These, if
bought at a reasonable
price, are **economical**.

N. B. O. Sheet Packing

is the **Economical** kind of sheet packing. It is
the "**cheapest per year**" sold, because it gives
you the most service for your money.

"N. B. O." is unequaled as a joint packing,
not only on steam lines, but also on **ammonia**,
gas, **oil** and **alkali**.

We'll be glad to send you a sample piece large
enough for you to give it a satisfactory trial.

Write today for our illustrated catalog

HOME RUBBER CO.
TRENTON, N. J.

STRATFORD OAKUM

QUALITY GUARANTEED

JERSEY CITY and EVERYWHERE

GEO. STRATFORD OAKUM CO., 165 Cornelson Ave., Jersey City, U. S. A.

The Clothel Company

MANUFACTURERS OF

Low Pressure

REFRIGERATING MACHINES

Marine Work a Specialty

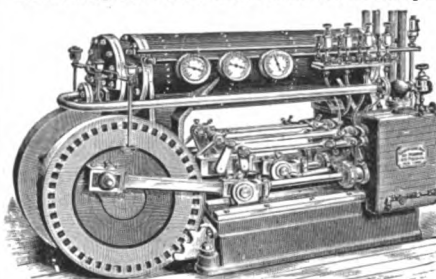
Office:

61 Broadway

- NEW YORK, N. Y.

The Allen Dense-Air Ice Machine

contains no chemicals. It is placed in the engine room, while the
ice-making box and meat rooms are at distant places of the steamer.



Over two
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daily service
in the tropics
on men-of-
war, steam
yachts and
mercantile
steamers.

H. B. ROELKER, Designer and Manufac-
turer of Screw Propellers
41 Malden Lane **NEW YORK**

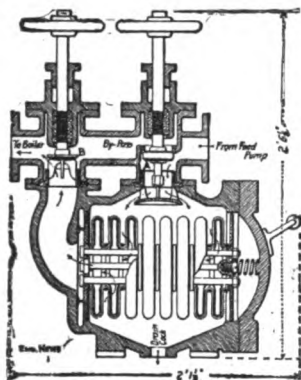
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A classified-by-products list of advertisers for the convenience of readers. If you don't find what you want, write us and we will tell you where to get it. Index to advertisements will give you page number of any advertiser and by referring to advertisement you can get full particulars about products.

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(Gas and Spar.)
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Dake Engine Co., Grand Haven, Mich.
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- CHOCKS.**
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- Welin Marine Equipment Co., Long Island City, N. Y.**
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Hanna, M. A., & Co., Cleveland, O.
Lorain Coal & Dock Co., Columbus, O.
Pickands, Mather & Co., Cleveland, O.
Pittsburgh Coal Co., Pittsburgh, Pa.
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Ritchie, E. S., & Sons, Brookline, Mass.
- CONDENSERS.**
American Engineering Co., Philadelphia, Pa.
Williams, Wm. E., New York, N. Y.
- CONDENSER SHELLS.**
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Continental Iron Works, The, Brooklyn, N. Y.
- CONVEYORS.**
General Electric Co., Schenectady, N. Y.
- CORDAGE.**
Waterbury Co., New York, N. Y.
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- CORK.**
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Williams, Wm. E., New York, N. Y.
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- DAVITS AND DAVIT FALLS.**
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Superior Iron Works, Superior, Wis.
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Furstenau, M. C., Philadelphia, Pa.
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Armstrong Mfg. Co., Bridgeport, Conn.
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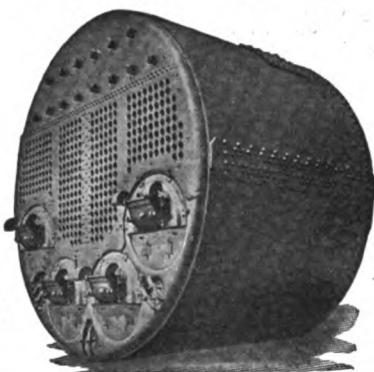
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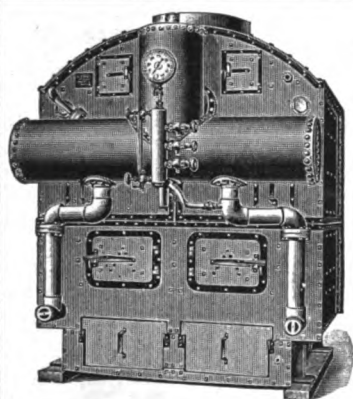
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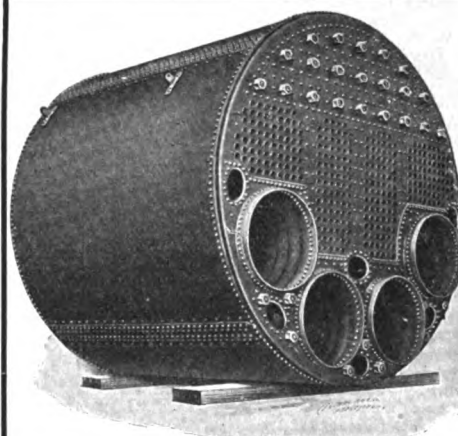


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Electric Control Co., New York City, N. Y.**ENAMELS.**
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Ross Valve Co., Troy, N. Y.

Williams, Wm. E., New York, N. Y.

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Chase Machine Co., Cleveland, O.

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Superior Iron Works, Superior, Wis.

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Superior Ship Building Co., Superior, Wis.

Toledo Ship Building Co., Toledo, O.

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Lorain Coal & Dock Co., Columbus, O.

Pickands, Mather & Co., Cleveland, O.

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Cummings Ship Instrument Works, Boston.

Electro-Dynamic Co., Bayonne, N. J.

McNab Co., Bridgeport, Conn.

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(Recording.)
McNab Co., Bridgeport, Conn.**INDICATORS.**
(Speed.)
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McNab Co., Bridgeport, Conn.

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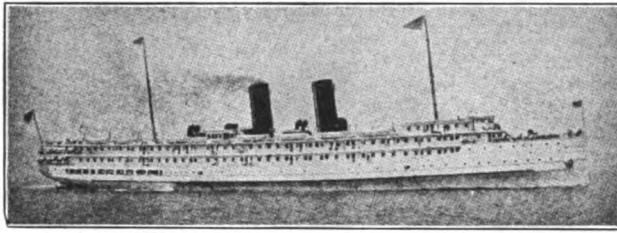
Kahnweiler's, David, Sons, New York City.

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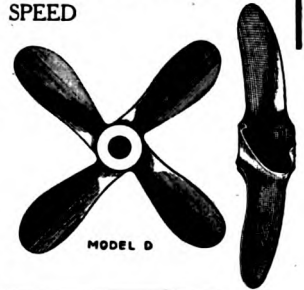
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Detroit Ship Building Co., Detroit, Mich.
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Fore River Ship Building Corp., Quincy, Mass.
Johnston Bros., Ferrysburg, Mich.
Manitowoc Ship Building Co., Manitowoc, Wis.
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Chicago Ship Building Co., So. Chicago, Ill.
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Milwaukee Dry Dock Co., Milwaukee, Wis.
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Waterbury Co., New York, N. Y.

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General Electric Co., Schenectady, N. Y.

MOTORS.
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General Electric Co., Schenectady, N. Y.

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Waterbury Co., New York, N. Y.

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(Second Hand.)
Cleveland & Erie Machinery Co., The, Cleveland, O.

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International Oxygen Co., New York City.

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International Oxygen Co., New York City.

OXYGEN GENERATORS.
International Oxygen Co., New York City.

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PACKING.
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U. S. Metallic Packing, The Co., Philadelphia

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Patterson-Sargent Co., Cleveland, O.

PAINT.
(Marine.)
Patterson-Sargent Co., Cleveland, O.

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PIPE.
(Welded Steel.)
Continental Iron Works, The, Borough of Brooklyn, N. Y.

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PNEUMATORS.
Pneumator, The Co., New York City.

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General Electric Co., Schenectady, N. Y.

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Baltimore Dry Dock & Shipbuilding Co., Baltimore, Md.
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Detroit Ship Building Co., Detroit, Mich.
Fore River Ship Building Corp., Quincy, Mass.
Milwaukee Dry Dock Co., Milwaukee, Wis.
Roelker, H. B., New York City, N. Y.
Sheriffs Mfg. Co., Milwaukee, Wis.
Superior Ship Bldg. Co., Superior, Wis.
Toledo Ship Building Co., Toledo, O.
Trout, H. G., Co., Buffalo, N. Y.

PROVISIONS.
(Ship.)
Duluth Marine Supply Co., Duluth, Minn.
Erdman, Joseph, Detroit, Mich.
Schroeder Bros. Co., Two Rivers, Wis.

PUMPS.
Boston & Lockport Block Co., E. Boston, Mass.

PUMPS AND APPLIANCES.
(Air.)
Kingsford Fdy. & Mch. Co., Oswego, N. Y.

PUMPS.
(Bilge.)
Blackmer Rotary Pump Co., Petoskey, Mich.

PUMPS.
(Miscellaneous Use.)
Blackmer Rotary Pump Co., Petoskey, Mich.
Kingsford Fdy. & Mch. Co., Oswego, N. Y.
Roelker, H. B., New York City, N. Y.
Van Duzen, The E. W., Co., Cincinnati, O.

PYROMETERS.
Locomotive Superheater Co., New York, N. Y.

REFRIGERATING MACHINERY.
Clother, The Co., New York City, N. Y.
Roelker, H. B., New York City, N. Y.

REGISTERING INSTRUMENTS.
(Draft.)
Pneumator, The Co., New York City.

REGULATORS.
(Pressure.)
Ross Valve Mfg. Co., Troy, N. Y.

RELEASING DEVICE.
(Life Boat.)
Mulholland Hatch-Fastener Co., Cleveland, O.

REPAIRS.
(Boiler.)
Commercial Boiler Wks., The, Seattle, Wash.

REPAIRS.
(Marine.)
American Ship Building Co., Cleveland, O.
Baltimore Dry Dock & Ship Bldg. Co., Baltimore, Md.

Buffalo Dry Dock Co., Buffalo, N. Y.
Chicago Ship Building Co., So. Chicago, Ill.
Collingwood Ship Bldg. Co., Ltd., Collingwood, Ont., Can.
Delaney, P., & Co., Newburgh, N. Y.
Detroit Ship Building Co., Detroit, Mich.
Fore River Ship Bldg. Corp., Quincy, Mass.
Goldschmidt Thermit Co., New York City.
Johnston Bros., Ferrysburg, Mich.
Manitowoc Ship Building Co., Manitowoc, Wis.
Milwaukee Dry Dock Co., Milwaukee, Wis.
Rocky River Dry Dock Co., Rocky River, O.
St. Lawrence Marine Ry. Co., Ogdensburg, N. Y.

Seattle Construction & Dry Dock Co., Seattle, Wash.
Superior Ship Bldg. Co., Superior, Wis.
Tietjen and Lang Dry Dock Co., Hoboken, N. J.

Toledo Ship Bldg. Co., Toledo, O.
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Cummings Ship Instrument Works, Boston.

RIGGING.
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Ward, The Chas., Engrg. Works., Charleston, W. Va.

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Waterbury Co., New York City, N. Y.
Williams, Wm. E., New York, N. Y.

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ROPE DRESSING.
Dixon, Joseph, Crucible Co., Jersey City, N. J.

ROPE DRIVES.
Waterbury Co., New York City, N. Y.

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General Electric Co., Schenectady, N. Y.

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American Screw Propeller Co., Philadelphia.

SCREW PROPELLERS.
(Manganese Bronze.)
American Manganese Bronze Co., Holmesburg, Pa.

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Cleveland & Erie Mch. Co., The, Cleveland, O.

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Stratford Oakum Co., Geo., Jersey City, N. J.

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Mulholland Hatch Fastener Co., Cleveland, O.

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Baltimore Dry Docks & Ship Bldg. Co., Baltimore, Md.

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Buffalo Dry Dock Co., Buffalo, N. Y.
Chicago Ship Building Co., South Chicago, Ill.
Collingwood Ship Building Co., Ltd., Collingwood, Ont., Can.
Detroit Ship Building Co., Detroit, Mich.
Fletcher, W. & A., Co., Hoboken, N. J.
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Johnston Bros., Ferrysburg, Mich.
Manitowoc Ship Building Co., Manitowoc, Wis.
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Moore & Scott Iron Works, San Francisco.
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Lake Erie Boiler Works, Buffalo, N. Y.

SOO RIVER FUEL DOCK.
Pittsburgh Coal Co., Pittsburgh, Pa.

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Standard Bridge Tool Co., Pittsburgh, Pa.

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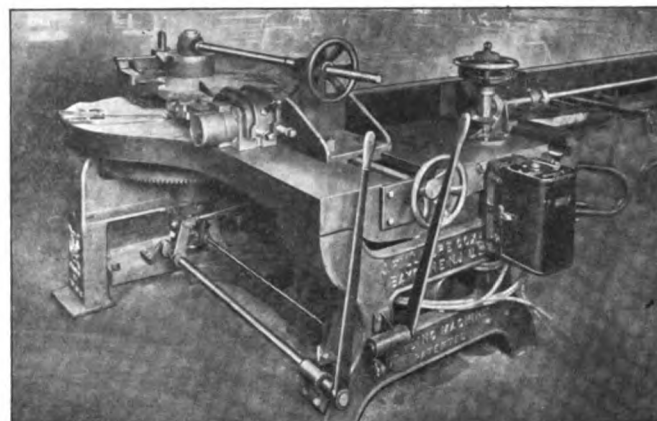
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The largest and most costly steamer on any inland water of
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Canadian points. Railroad tickets reading between Cleveland
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 (Boiler, Iron or Steel, Hollow or Solid.)
 Falls Hollow Staybolt Co., Cuyahoga Falls, O.
 Scully Steel & Iron Co., Chicago, Ill.
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 Barton Steam Trap Co., Cleveland, O.
STEAM TURBINES.
 DeLaval Steam Turbine Co., Trenton, N. J.
STEAMSHIP FUEL.
 Pittsburgh Coal Co., Pittsburgh, Pa.
STEAMSHIP LINES.
 (Passenger and Freight.)
 American Line, New York City, N. Y.
 International Merchant Marine Co., New York City, N. Y.
STEERING GEARS.
 American Engineering Co., Philadelphia, Pa.
 American Ship Building Co., Cleveland, O.
 Chase Machine Co., Cleveland, O.
 Dake Engine Co., Grand Haven, Mich.
 Detroit Ship Building Co., Detroit, Mich.
STOCKS.
 Armstrong Mfg. Co., Bridgeport, Conn.
STOKERS.
 American Engineering Co., Philadelphia, Pa.
 Babcock & Wilcox Co., New York, N. Y.
STOPPERS.
 (Chain.)
 American Engineering Co., Philadelphia, Pa.
SUBMARINE ARMOR.
 Morse, A. J., & Son, Boston, Mass.
 Schrader's, A. Son, Inc., Brooklyn, N. Y.
SUPERHEATERS.
 (Locomotive.)
 Locomotive Superheater Co., New York, N. Y.
SUPERHEATERS.
 (Marine.)
 Babcock & Wilcox Co., New York, N. Y.
 Locomotive Superheater Co., New York, N. Y.
SUPPLY HOUSES.
 Duluth Marine Supply Co., Duluth, Minn.
 Erdman, Joseph, Detroit, Mich.
 Schroeder Bros. Co., Two Rivers, Wis.
 Williams, Wm. E., New York, N. Y.
SURVEYORS.
 (Marine.)
 Babcock & Penton, Cleveland, O.
 Curr, Robert, Port Arthur, Ont., Can.
 Furstenau, M. C., Philadelphia, Pa.

SWITCHBOARDS.

General Electric Co., Schenectady, N. Y.
TANKS.
 Bath Iron Works, Bath, Me.
TANKS.
 (Riveted.)
 Lake Erie Boiler Works, Buffalo, N. Y.
TANKS.
 (Steel.)
 Fore River Ship Bldg. Corp., Quincy, Mass.
TANKS.
 (Welded Steel.)
 Continental Iron Works, The, Borough of Brooklyn, N. Y.
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 (Mechanical.)
 Cory, Chas., & Son, New York City, N. Y.
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 (Rope.)
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 Barton Steam Trap Co., Cleveland, O.
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 Bath Iron Works, Bath, Me.
TURBINES.
 Bath Iron Works, Bath, Me.
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Two McMyler
 All Steel
 Revolving
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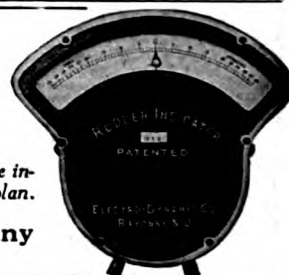
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Placed in pilot house or on bridge in
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 the same as he does the compass. Can be in-
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Electrically equipped. Best of service and rate guaranteed. Steel parts reinforced and shaped. Machine shop conveniences.
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Built 1901, 3,400 tons coal capacity.
Leatham & Smith, T. & W. Co.
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DESCRIPTION.

50-ft. keel; 55-ft. overall; 10-ft. 6-in. beam. Equipped with 4 cylinders, 40-H. P. Fairbanks, Morse Engine. We are operating the "Harold A" at Ashland, Wis., where same can be inspected.

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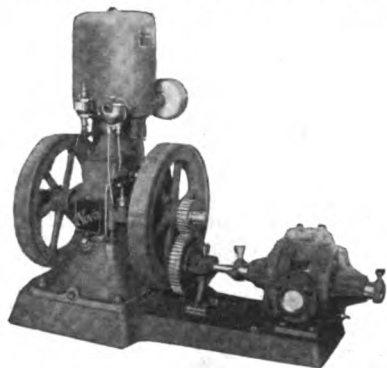
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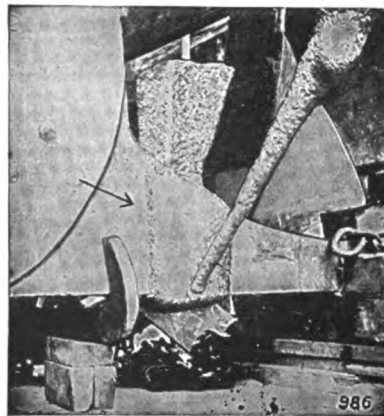
All pumps have but five working parts.

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Priming not necessary.

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Quick Marine Repairs

Thermit Welding is quick, easy and effective—and when applied to broken rudder frames, sternposts, or sternframes, will enable your vessel to return to service in two or three days, effecting a tremendous saving in dry dock charges.

There is nothing experimental about Thermit Welding. During the last few years we have executed many repairs for the principal steamship companies of the Atlantic and Pacific coasts and the Great Lakes and every repair has been uniformly successful and our best advertisement.

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PROPELLER WHEELS and PROPELLER BLADES to fit any hub.

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OXYGEN and HYDROGEN GENERATORS

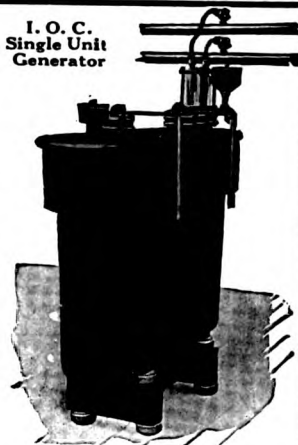
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Single Unit
Generator



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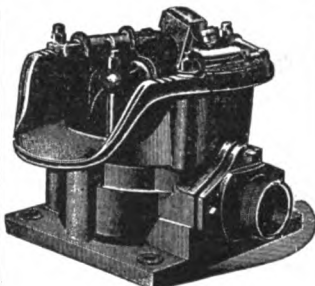


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**Producers and Shippers of ECLIPSE HOCKING
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PICKANDS, MATHER & CO.



Lighter "West Shore," Buffalo, N. Y.
Capacity 500 Tons per hour

FUEL LIGHTERS at Buffalo, Erie, Ashtabula, Cleveland. At Detour, Mich., a Fuel Dock equipped with chute capacity of 600 tons. Best quality Pittsburgh coal furnished at any time during day or night.

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Adopted by the English, German, French, Russian, Italian and United States Lighthouse Departments for Channel and Harbor Lighting. Over 2,200 Buoys and Gas Beacons in service.

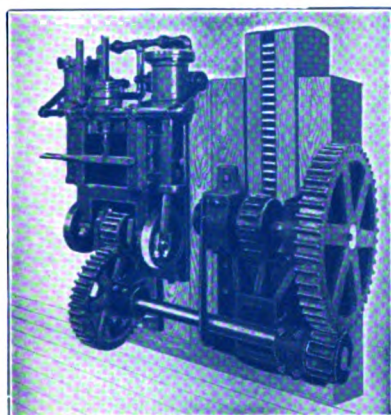
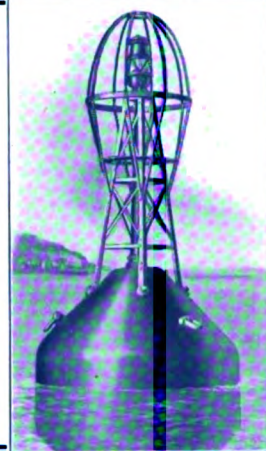
Burn Continuously From Eighty to Three Hundred and Sixty-five Days and Can be Seen a Distance of Six Miles

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Anchor Hoist Engines and Lock Plates

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Double 6" x 6", 7" x 9" and 9" x 10" Throttle Reverse Engines

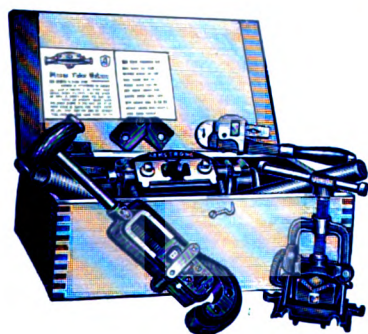
With Gearing to suit the size of Anchors

The Hoist is compact and efficient, and occupies no deck room. Any arrangement can be made to suit local conditions.

We build the engines with either throttle or link reverse, as well as non-reversible and for a great many purposes.

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ARMSTRONG COMBINATION KITS

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| 1 No. 2 Genuine Armstrong Stock | $\frac{1}{4}$ in. to 1 in. R |
| 1 " 1 Model B Pipe Cutter | $\frac{1}{8}$ " $1\frac{1}{4}$ |
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STOCKS ARE FITTED WITH BARD ADJUSTABLE BUSHING
IN A HARD WOOD CASE

ENGINEERS AND FITTERS APPRECIATE THIS KIT.

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Durable Wire Rope Co.

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Durable Wire Rope will Not Rust or Rot and is not affected by Salt Water or Climatic Conditions

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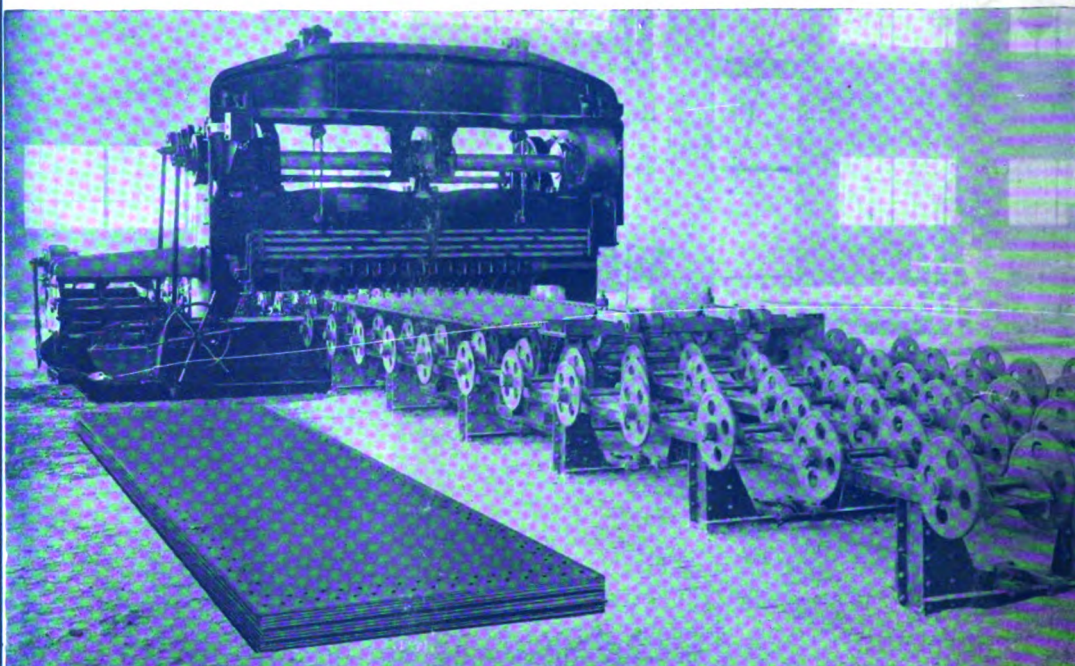
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FOR PUNCHING ALL KINDS OF PLATES

Ship—Steel Barges—Tanks—Boilers, Etc.

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SIX LUCKENBACH Steamers Building

are to be equipped with the

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Safety first in navigation

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Over 75 installations on battleships, torpedo boats, submarines, yachts and merchant ships.

We also make the Gary-Cummings torsion meter. Over 100 now giving satisfactory and accurate results.

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AUTOMATIC INJECTOR

No other
INJECTOR
on the
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so simple,
reliable
or durable.



800,000
Engineers
testify
as to its
merits.
WORLD'S
STANDARD.

The Penberthy Automatic is absolutely so, it is re-starting, self-draining. It is the ideal Injector for Marine use.

"XL-96" EJECTOR



On account of the great elevating and lifting power of the "XL-96" when using a minimum amount of steam, it is at its best when replacing the bilge pump.

Our No. 27 Catalog tells of these.
Write for it—Now.

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THE MARINE REVIEW

VOL. 46

CLEVELAND

NOVEMBER, 1916

NEW YORK

No. 11

Increase Your Production Without Extra Expense

Chipping Hammers
with single valve—
Long Stroke Rivet-
ing Hammers made
from one solid
piece—can't come
loose.

Thor

Piston Air Drills,
Corliss Valves, Roller
Bearings, Telescopic
Screw Feed One-
Piece Connecting
Rods.

Pneumatic Tools Develop the Greatest
Power and Speed at the Lowest Cost



Size B *Thor* Chipping Hammer cutting and finish-
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Single Valve—No Vibration

12,590

Thor Pneumatic Tools of
various sizes are in
daily use in the shipyards and
dry docks of the United States.
Their pre-eminence as the tool
for shipbuilders is recognized
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in supplying tools for all
classes of work may be of
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any information you want
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air tools for any kind of
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Shipped on Trial

Improved methods of Manufacturing
and Increased production enable us
to offer *Thor* Tools for

"Immediate Delivery"

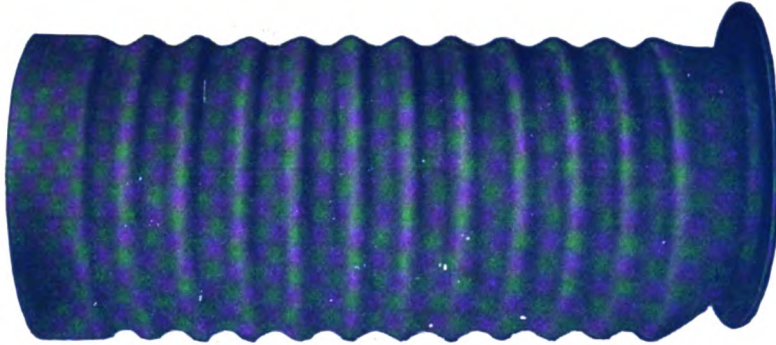


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holes in heavy work on water-way bars. Equipped
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oversize tangs and shanks on twist drills and reamers.

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Morison Suspension Boiler Furnaces



**For Land
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Uniform Thickness,

Easily Cleaned,

Unexcelled for Strength.

Also FOX CORRUGATED FURNACES

Manufactured by

THE CONTINENTAL IRON WORKS

West and Calyer Sts., BOROUGH OF BROOKLYN, N. Y.

Greenpoint Ferry from East 23rd Street, New York

CAPTAIN N. SIMONSON, President

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The Rocky River Dry Dock Co.

Rocky River, Ohio

Our 500 ft. of MARINE RAILWAY and acreage of property give us an immense advantage over other dry docks. We can haul out craft, and by shifting them around for convenience, can work on an almost unlimited number.

Our methods will save you excessive dry dock charges!

Our CAPACITY

We can handle anything that floats up to a 200 foot length, 40 foot beam, 12 foot draft.

We are now soliciting and booking orders for winter work. We employ a force of 75 men who have at their disposal every modern convenience including a complete mill for getting out material; a large up-to-the-minute electric derrick; a great number of electric drills, etc. All work is thoroughly guaranteed, and we keep our promises.

We have FACILITIES

For repairing Hulls, Boilers and Engines for large and small vessels, tugs, power boats and yachts.

**TRY US—
AND SAVE MONEY**

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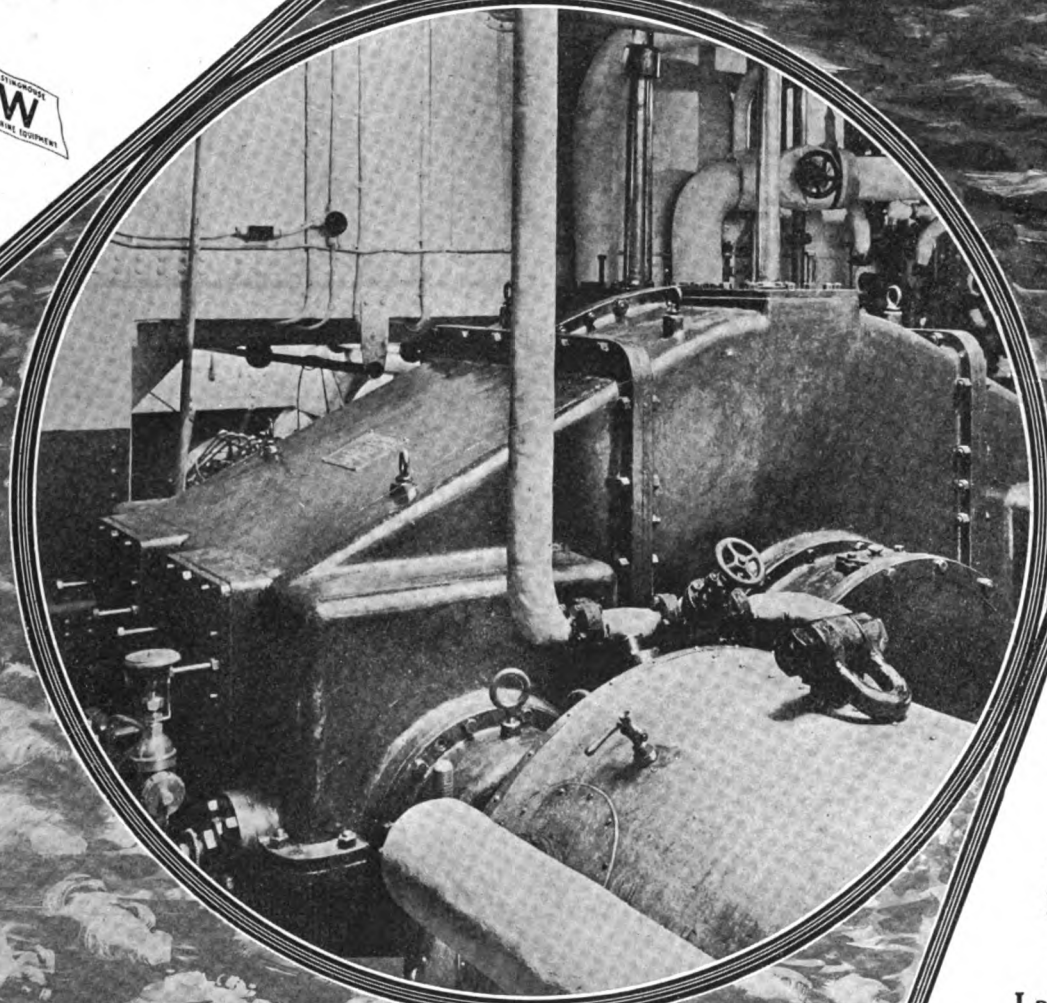
Westinghouse Marine Gears

The U. S. S. Melville

The propellers of the U. S. S. Melville are driven through Westinghouse Reduction Gears. The flexible pinion frame of the Westinghouse Gear provides means of compensating for torsional deflection and of insuring correct tooth alignment at all loads. The advantages of this construction are minimum wear, long life and a gear of great reliability.

The Westinghouse Machine Co.
Washington, D. C., East Pittsburgh, Pa.

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San Francisco - Seattle



**Marine
Turbines
and
Reduction
Gears,
Condensers
and
Auxiliaries,
Lablanc Air
Ejectors,
Lablanc Ice
and Refrigerating
Systems,
and Turbine Driven
Lighting Sets.**

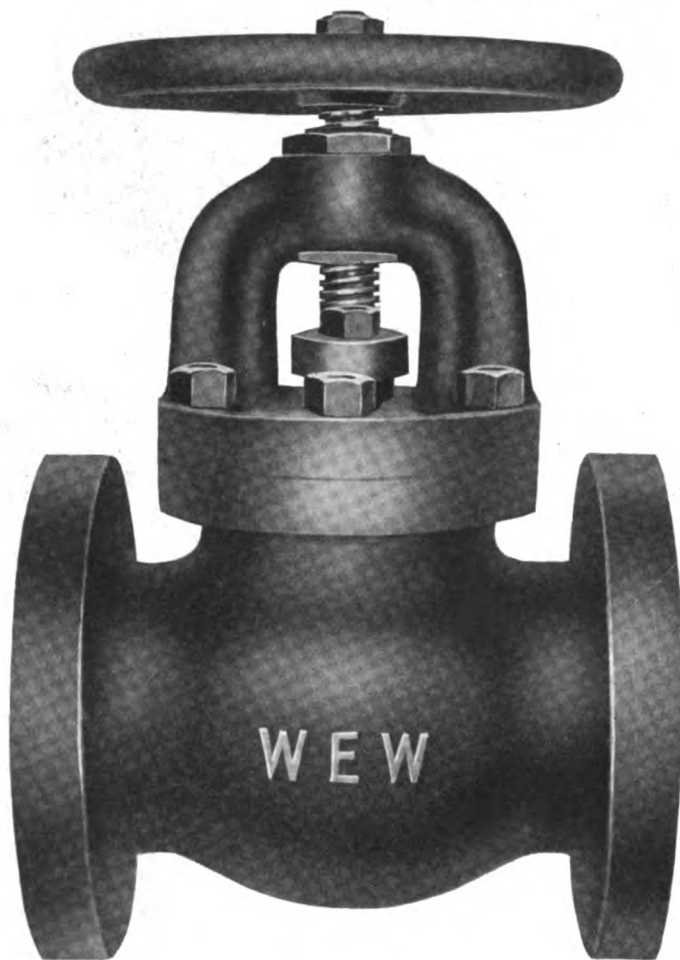
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are especially made for Marine Service, and
are thoroughly guaranteed in every respect



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Check Valves
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We carry a full line of Bronze and Iron Body Valves in stock. Send at once for our catalog which shows the most important and most used types of valves. If the valve you require is not shown, remember we make it.

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